County of San Diego
PRIORITY DEVELOPMENT PROJECT (PDP) SWQMP

JAMUL RETAIL CENTER
PERMIT NUMBER:

WEST SIDE OF JEFFERSON ROAD
JAMUL, CALIFORNIA, 91935

ASSESSOR'S PARCEL NUMBER(S):
596-071-60

ENGINEER OF WORK:

Brendan Hastie, R.C.E. #65809, Exp. 9/19

PREPARED FOR:

Woodcrest REV
1410 Main Street, Suite C
Ramona, California 92065
760-271-9400

PDP SWQMP PREPARED BY:

RICK ENGINEERING COMPANY
5620 Friars Road
San Diego, California 92110
619-291-0707

DATE OF SWQMP:
March 26, 2018
Revised: July 10, 2018
Revised: October 10, 2018

PLANS PREPARED BY:
RICK ENGINEERING COMPANY
5620 Friars Road
San Diego, CA. 92110
619-291-0707

SWQMP APPROVED BY:

APPROVAL DATE:

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Table of Contents

Attachments

Acronyms

ACP	Alternative Compliance Project
APN	Assessor's Parcel Number
BMP	Best Management Practice
BMP DM	Best Management Practice Design Manual
HMP	Hydromodification Management Plan
HSG	Hydrologic Soil Group
MS4	Municipal Separate Storm Sewer System
N/A	Not Applicable
NRCS	Natural Resources Conservation Service
PDCI	Private Development Construction Inspection Section
PDP	Priority Development Project
PDS	Planning and Development Services
PE	Professional Engineer
RPO	Resource Protection Ordinance
SC	Source Control
SD	Site Design
SDRWQCB	San Diego Regional Water Quality Control Board
SIC	Standard Industrial Classification
SWQMP	Storm Water Quality Management Plan
WMAA	Watershed Management Area Analysis
WPO	Watershed Protection Ordinance
WQIP	Water Quality Improvement Plan

PRIORITY DEVELOPMENT PROJECT (PDP) SWQMP
FOR
JAMUL RETAIL CENTER

REVISION PAGE

October 10, 2018

Pursuant to the comments provided by the County of San Diego dated September 11, 2018, this report presents a revision to the PDP SWQMP for Jamul Retail Center dated July 10, 2018, prepared by Rick Engineering Company. The following text identifies the review comments issued by the County in italics, followed by Rick Engineering Company's response in bold.

4-4. Worksheet B5-1:
**BMP 1 does not meet the water quality volume and the surface ponding drawdown requirements. Revise the design for this BMP accordingly.*

**Ensure the properties of basins between worksheet B5-1 and SWMM model are consistent. For example, SWMM model and the basins details show surface ponding of 12" for basins 1 and 2 but worksheet B5-1 shows surface ponding of 6" for these basins.*

8/28/2018 Update:
It is unclear why Partial Infiltration BMP is not being proposed. Based on the infiltration feasibility criteria, any location with infiltration rate > 0.01 inches/hr can support a partial infiltration design unless there are geotechnical risks associated with the infiltration. Based on the submitted recommendations from the geotechnical engineer, there seem to be no risks from infiltration; it is unclear why partial infiltration is not being proposed onsite.

Revise the design of the BMP's based on this comment..

The proposed BMPs only utilize 6-inches of ponding for water quality purposes (i.e., the required DCV is provided with the sub-surface volume and only 6-inches of ponding). The additional 6-inches of ponding above the WQ ponding depth is used for HMP purposes (i.e., to provide detention of the low-flow events). Due to the HMP low-flow threshold and required volume, the low-flow orifice results in a draw-down time greater than 24-hrs (approximately 33 hrs). BMP 1 has more than enough static storage to hold the DCV for DMA 1 and provides a footprint in excess of 3% of the effective impervious area. The drawdown time for BMP 1 will be finalized during the final engineering phase, and if it is in excess of 24-hrs it will be coordinated with the County and the project's Landscape Architect. Narrative regarding this comment has been added to Step 6.1 for additional clarification.

Pursuant to coordination with the project's geotechnical engineer, infiltration BMPs should not be proposed in areas of fill. BMPs 1 and 2 are located in areas of fill; therefore, they do not propose infiltration. The design of BMP 3 assumes a no-infiltration condition, which is conservative. Partial infiltration for each BMP will be further evaluated during final engineering and Form I-8 will be updated pursuant to further coordination with the geotechnical engineer.

4-5. I-8 Form:

Provide justification for all the responses in form I-8.

8/28/2018 Update:

Revise the response for I-8 form to support a partial infiltration. Based on the measured inflation rates and the recommendation from the geotechnical engineer, there are no risks associated with partial infiltration. It is unclear why I-8 form is selecting No infiltration as conclusion.

Refer to response for Comment 4-4.

4-6. 8/28/2018 Update:

*DMA Exhibit (Attachment 1C/2B):*Clearly show on the plans how the outfall structures for basins 1 will be accessed for maintenance. Please note based on the existing topography, an access road may need to be provided. Any Additional impervious area required for the construction of access roads should be included as part of the stormwater calculation.*

It is unclear how the inlet at the back of the DG pathway will collect drainage from the existing and proposed pavement along Jefferson Road. Based on the typical cross section, the flows drain away from the DG pathway to the gutter. Please clarify the design.

Pursuant to coordination with the Project's Biologist, an access road cannot be provided since it would require disturbance of the Biological Open Space Preserve. Therefore, an access road is not proposed.

The proposed curb inlets on Jefferson Road will intercept drainage from the existing/proposed pavement along Jefferson Rd. These inlets will only intercept flow from the western half of Jefferson Rd. The eastern half is not being improved as part of this project; therefore, it will not be intercepted by proposed inlets. The DG path drains towards the street. Please refer to the TM Plans, specifically Jefferson Rd Cross Sections A-A and B-B, and the project's Drainage Study for more information regarding drainage characteristics, storm drain, and inlets.

4-10. Step 3.7.1 (Page 15): Select the third item related to bypass of the onsite and upstream CCSYA under scenario 1. Please note the project will be required to show the bypass of the offsite upstream CCSYA during the final engineering submittal.

The box has been selected as required.

4-11. Step 6.1 (Page 24): Clarify how the Excess treated impervious area is being routed to the proposed BMP's. Based on the location of the inlets and the typical cross section provided, no part of the road widening or existing pavement will be captured by the proposed inlets at the back of the walkway.

Additionally the type of proposed BMP may need to be revised based on revised recommendation on form I-8.

The existing and proposed impervious area on the western half of Jefferson Road slopes towards the proposed inlets. Please refer to the TM Plans, specifically, the proposed grading on Jefferson Rd and Cross Sections A-A and B-B for additional information. Contour intervals have been decreased to 2-ft intervals on the PDP Exhibits for clarity. Refer to Response to Comments 4-4 and 4-5 for updated information regarding BMP design.

4-12. Step 6.2 (Page 25): Revise the Structural BMP Checklist based on comments provided on form I-8.

Pursuant to coordination with the project's geotechnical engineer, infiltration BMPs should not be proposed in areas of fill. BMPs 1 and 2 are located in areas of fill; therefore, they do not propose infiltration. The design of BMP 3 assumes a no-infiltration condition, which is conservative. Partial infiltration for each BMP will be further evaluated during final engineering and Form I-8 will be updated at that time pursuant to further coordination with the geotechnical engineer

4-13. Please note there are new comments on Attachment 1 because on the previous submittal, I-8 form had an assumption that any infiltration will cause negative impact at the project site. That assumption does not match the new submitted geotechnical recommendation. Hence the type of BMP proposed need to be revised to allow partial infiltration.

Noted. Refer to comment response 4-12 for additional information.

4-14. Verify the answers provided for infiltration rate and the negative impacts from infiltration to match the determination in form I-8.

Refer to comment response 4-12 for additional information.

4-15. It is unclear why infiltration rate of 0 is assumed for all BMP's. The infiltration rates used here should match the values in the geotechnical report.

Refer to comment response 4-12 for additional information.

4-16. Revise the detail of the BMP or the table to show the size of the low flow orifice.

BMP details have been updated accordingly.

PRIORITY DEVELOPMENT PROJECT (PDP) SWQMP
FOR
JAMUL RETAIL CENTER

REVISION PAGE

July 10, 2018

Pursuant to the comments provided by the County of San Diego dated June 15, 2018, this report presents a revision to the report dated March 26, 2018, prepared by Rick Engineering Company. The following text identifies the review comments issued by the County in italics, followed by Rick Engineering Company's response in bold.

1. *Include the project number on the title sheet.*

   The project number has been added to the title sheet as requested.

2. *The final SWQMP report shall be signed, stamped and dated by the responsible California Registered Civil Engineer.*

   The report has been signed, stamped and dated accordingly.

3. *Step 3 (Page 6):*
   Under "Existing Natural Hydrologic Features" remove the checklist from the "None" category.

   The "None" category under the "Existing Natural Hydrologic Features" has been removed from the checklist as requested. Only "watercourses" has been selected since the project is proposing a storm drain outfall with a rip-rap pad adjacent to the unnamed natural channel that is tributary to Steele Canyon Creek, just east of the project site.

4. *Worksheet B5-1:*
   BMP 1 does not meet the water quality volume and the surface ponding drawdown requirements. Revise the design for this BMP accordingly.

   Ensure the properties of basins between worksheet B5-1 and SWMM model are consistent. For example, SWMM model and the basins details show surface ponding of 12" for basins 1 and 2 but worksheet B5-1 shows surface ponding of 6" for these basins.

   The proposed BMPs only utilize 6-inches of ponding for water quality purposes (i.e., the required DCV is provided with the sub-surface volume and only 6-inches of ponding). The additional 6-inches of ponding above the WQ ponding depth is used for HMP purposes (i.e., to provide detention of the low-flow events). Due to the HMP low-flow threshold and required volume, the low-flow orifice results in a draw-down time greater than 24-hrs (approximately 33 hrs). BMP 1 has more than enough static storage to hold the DCV for DMA 1 and provides a footprint in excess of 3% of the effective impervious area. The drawdown time for BMP 1 will be finalized during the final engineering phase, and if it is in excess of 24-hrs it will be coordinated with the County and the project's Landscape Architect. Narrative regarding this comment has been added to Step 6.1.

5. *I-8 Form:*
   Provide justification for all the responses in form I-8.

   The project's geotechnical report is now provided within Appendix 7 for reference purposes, which includes the geotechnical engineer's responses to form I-8.

6. *DMA Exhibit (Attachment 1C/2B):*
   Clearly label the DMA's that cover the required frontage improvements along Jefferson Road. The DMA may be missing the labels for DMA 2-B and 3-B. Verify and make any necessary changes.

   Revise the limits of the DMA and the DCV calculations to include all the required road frontage improvements listed in item 1-2 above.

   Provide a table with the breakdown of impervious area for each DMA.

   Clearly show on the plans how the outfall structures for basins 1 will be accessed for maintenance. Please note based on the existing topography, an access road may need to be provided. Any additional impervious area required for the construction of access roads should be included as part of the stormwater calculation.

   The DMA exhibit has been updated to provide missing DMA labels and to be consistent with the latest site plan. DMA boundaries, DCVs, and the site plan have all been updated accordingly. A table of each DMA with hydrologic characteristics is now provided within the DMA exhibit. Refer to the project's improvement plans for maintenance access.

7. *Revise the SWMM model to show analysis at the point of discharge of BMP 1 not just at POC 1.*

   The modeled POC in the SWMM Model is the project outfall, where storm water generated from the site discharges into the existing natural channel (including stormwater from BMP 1). For graphical purposes, the point of compliance (POC) is shown as the discharge point for the existing condition. In order to minimize the impacts to riparian and environmental areas, the outfall location in the post-project condition was proposed within the unnamed tributary to Steele Canyon Creek. For additional information regarding the outfall location refer to the project's drainage study.

8. *Ensure the properties of basins between SWMM model, Worksheet B5-1, and the provided BMP detail are consistent. For example, BMP 3 is modeled with 12" ponding depth in SWMM which is not constant with Worksheet B5-1 and the BMP detail provided. Verify and make any necessary changes.*

   The proposed BMPs only utilize 6-inches of ponding for water quality purposes. The additional 6-inches of ponding above the WQ ponding depth is used for HMP purposes (i.e., to provide detention of the low-flow events). WQ calculations are based on the 6-inches of ponding and HMP calculations are based on 12-inches of ponding. The SWMM models have been updated to be consistent with the latest site plan; however, continue to use 12-inches of ponding prior to the first mid-flow orifice.

9. *Provide a digital copy of the model on the next submittal.*

   A Digital copy of the SWMM model has been provided as requested as a CD pocket.

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PDP SWQMP Preparer's Certification Page

Project Name: Jamul Retail Center
Permit Application Number: PDS2018-MUP18-008 and PDS2018-TPM-21262

PREPARER'S CERTIFICATION

I hereby declare that I am the Engineer in Responsible Charge of design of storm water best management practices (BMPs) for this project, and that I have exercised responsible charge over the design of the BMPs as defined in Section 6703 of the Business and Professions Code, and that the design is consistent with the PDP requirements of the County of San Diego BMP Design Manual, which is a design manual for compliance with local County of San Diego Watershed Protection Ordinance (Sections 67.801 et seq.) and regional MS4 Permit (California Regional Water Quality Control Board San Diego Region Order No. R9-2013-0001 as amended by R9-2015-0001 and R9-2015-0100) requirements for storm water management.

I have read and understand that the County of San Diego has adopted minimum requirements for managing urban runoff, including storm water, from land development activities, as described in the BMP Design Manual. I certify that this PDP SWQMP has been completed to the best of my ability and accurately reflects the project being proposed and the applicable BMPs proposed to minimize the potentially negative impacts of this project's land development activities on water quality. I understand and acknowledge that the plan check review of this PDP SWQMP by County staff is confined to a review and does not relieve me, as the Engineer in Responsible Charge of design of storm water BMPs for this project, of my responsibilities for project design.

Brendan Hastie, #65809, Exp. 9/30/19
Engineer of Work's Signature, PE Number & Expiration Date

Brendan Hastie
Print Name

RICK Engineering Company
Company

10/10/2018
Date

Engineer's Seal:

Template Date: August 28, 2017

Preparation Date: March 26, 2018
Revised: July 10, 2018
Revised: October 10, 2018

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Submittal Record

Use this Table to keep a record of submittals of this PDP SWQMP. Each time the PDP SWQMP is re-submitted, provide the date and status of the project. In column 4 summarize the changes that have been made or indicate if response to plancheck comments is included. When applicable, insert response to plancheck comments behind this page.

Preliminary Design / Planning / CEQA

Submittal Number	Date	Summary of Changes
1	3/26/2018	Initial Submittal
2	7/10/2018	2nd Submittal
3	10/10/2018	3rd Submittal – Address Comments dated 9/11/18 from the County of San Diego.
4		

Final Design

Submittal Number	Date	Summary of Changes
1		Initial Submittal
2		
3		
4		

Plan Changes

Submittal Number	Date	Summary of Changes
1		Initial Submittal
2		
3		
4		

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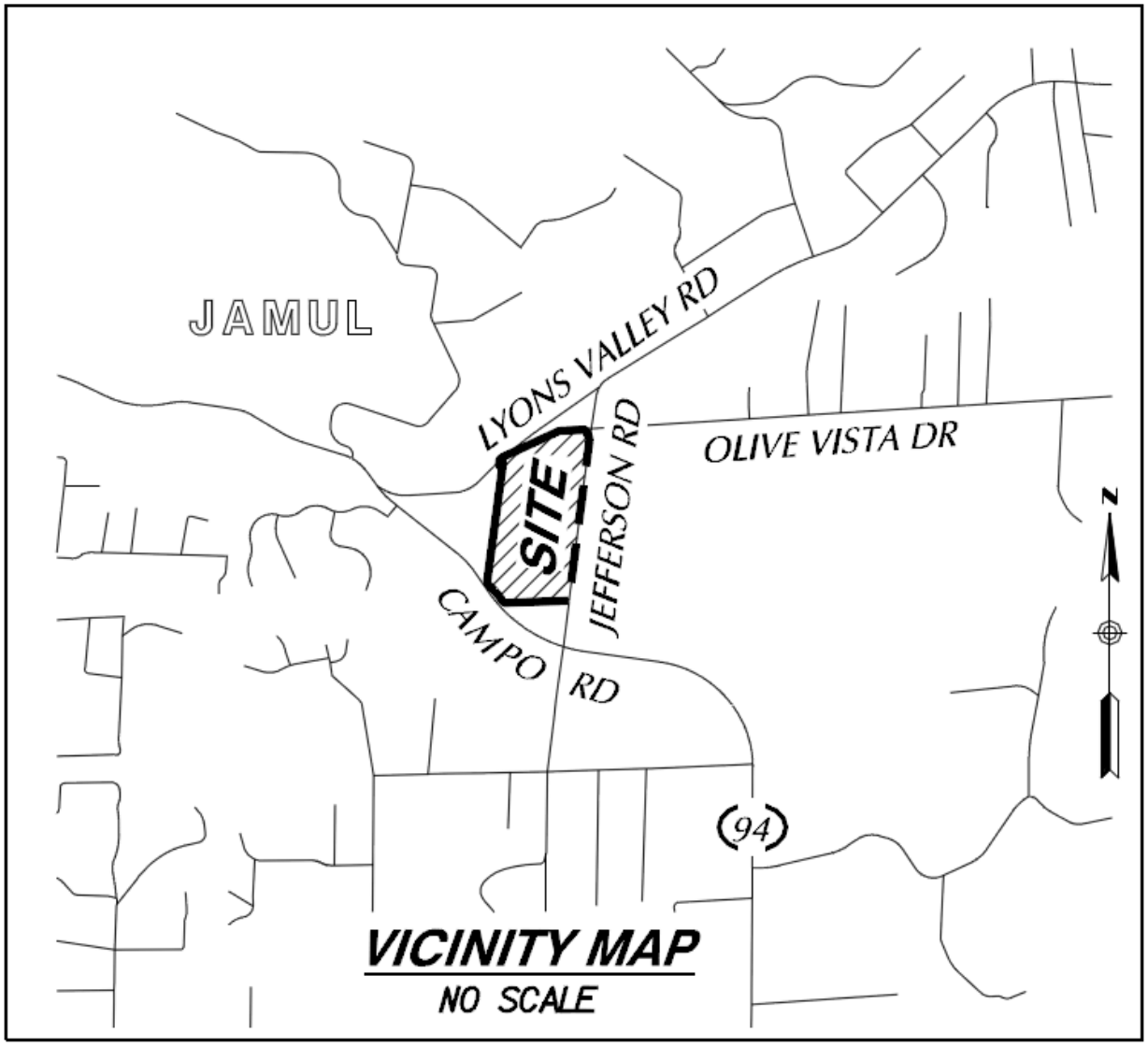
Project Vicinity Map

Project Name: Jamul Retail Center
Record ID: PDS2018-MUP-18-008 and PDS2018-TPM-21262



Step 1: Project type determination (Standard or Priority Development Project)

Is the project part of another Priority Development Project (PDP)? If so, a PDP SWQMP is required. Go to Step 2.			(☐ Yes ☒ No
The project is (select one): ☒ New Development ☐ Redevelopment[1]			
The total proposed newly created or replaced impervious area is: ft^2			259,500
The total existing (pre-project) impervious area is: ft^2			14,340
The total area disturbed by the project is: ft^2			431,244
If the total area disturbed by the project is 1 acre (43,560 sq. ft.) or more OR the project is part of a larger common plan of development disturbing 1 acre or more, a Waste Discharger Identification (WDID) number must be obtained from the State Water Resources Control Board. WDID: ___			
Is the project in any of the following categories, (a) through (f)?[2]			
Yes ☒	No ☐	(a)	New development projects that create 10,000 square feet or more of impervious surfaces[3](collectively over the entire project site). This includes commercial, industrial, residential, mixed-use, and public development projects on public or private land.
Yes ☐	No ☒	(b)	Redevelopment projects that create and/or replace 5,000 square feet or more of impervious surface (collectively over the entire project site on an existing site of 10,000 square feet or more of impervious surfaces). This includes commercial, industrial, residential, mixed-use, and public development projects on public or private land.
Yes ☒	No ☐	(c)	New and redevelopment projects that create and/or replace 5,000 square feet or more of impervious surface (collectively over the entire project site), and support one or more of the following uses: (i) Restaurants. This category is defined as a facility that sells prepared foods and drinks for consumption, including stationary lunch counters and refreshment stands selling prepared foods and drinks for immediate consumption (Standard Industrial Classification (SIC) code 5812). (ii) Hillside development projects. This category includes development on any natural slope that is twenty-five percent or greater. (iii) Parking lots. This category is defined as a land area or facility for the temporary parking or storage of motor vehicles used personally, for business, or for commerce. (iv) Streets, roads, highways, freeways, and driveways. This category is defined as any paved impervious surface used for the transportation of automobiles, trucks, motorcycles, and other vehicles.

[1] Redevelopment is defined as: The creation and/or replacement of impervious surface on an already developed site. Examples include the expansion of a building footprint, road widening, the addition to or replacement of a structure, and creation or addition of impervious surfaces. Replacement of impervious surfaces includes any activity that is not part of a routine maintenance activity where impervious material(s) are removed, exposing underlying soil during construction. Redevelopment does not include routine maintenance activities, such as trenching and resurfacing associated with utility work; pavement grinding; resurfacing existing roadways; new sidewalks construction; pedestrian ramps; or bike lanes on existing roads; and routine replacement of damaged pavement, such as pothole repair.

[2] Applicants should note that any development project that will create and/or replace 10,000 square feet or more of impervious surface (collectively over the entire project site) is considered a new development.

[3] For solar energy farm projects, the area of the solar panels does not count toward the total impervious area of the site.

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Project type determination (continued)

Yes ☒	No ☐	(d)	New or redevelopment projects that create and/or replace 2,500 square feet or more of impervious surface (collectively over the entire project site), and discharging directly to an Environmentally Sensitive Area (ESA). "Discharging directly to" includes flow that is conveyed overland a distance of 200 feet or less from the project to the ESA, or conveyed in a pipe or open channel any distance as an isolated flow from the project to the ESA (i.e. not commingled with flows from adjacent lands). *Note: ESAs are areas that include but are not limited to all Clean Water Act Section 303(d) impaired water bodies; areas designated as Areas of Special Biological Significance by the State Water Board and San Diego Water Board; State Water Quality Protected Areas; water bodies designated with the RARE beneficial use by the State Water Board and San Diego Water Board; and any other equivalent environmentally sensitive areas which have been identified by the Copermittees. See BMP Design Manual Section 1.4.2 for additional guidance.*
Yes ☐	No ☒	(e)	New development projects, or redevelopment projects that create and/or replace 5,000 square feet or more of impervious surface, that support one or more of the following uses: (i) Automotive repair shops. This category is defined as a facility that is categorized in any one of the following SIC codes: 5013, 5014, 5541, 7532-7534, or 7536-7539. (ii) Retail gasoline outlets (RGOs). This category includes RGOs that meet the following criteria: (a) 5,000 square feet or more or (b) a projected Average Daily Traffic (ADT) of 100 or more vehicles per day.
Yes ☒	No ☐	(f)	New or redevelopment projects that result in the disturbance of one or more acres of land and are expected to generate pollutants post construction. *Note: See BMP Design Manual Section 1.4.2 for additional guidance.*

Does the project meet the definition of one or more of the Priority Development Project categories (a) through (f) listed above?

☐ No – the project is not a Priority Development Project (Standard Project).

☒ Yes – the project is a Priority Development Project (PDP).

Further guidance may be found in Chapter 1 and Table 1-2 of the BMP Design Manual.

The following is for **redevelopment PDPs only**:

The area of existing (pre-project) impervious area at the project site is: ft^2 (A)
The total proposed newly created or replaced impervious area is ft^2 (B)
Percent impervious surface created or replaced (B/A)*100: %
The percent impervious surface created or replaced is (select one based on the above calculation):

☐ less than or equal to fifty percent (50%) – **only newly created or replaced impervious areas are considered a PDP and subject to stormwater requirements**

OR

☐ greater than fifty percent (50%) – **the entire project site is considered a PDP and subject to stormwater requirements**

Step 1.1: Storm Water Quality Management Plan requirements

Step	Answer	Progression
Is the project a Standard Project, Priority Development Project (PDP), or exception to PDP definitions? To answer this item, complete Step 1 Project Type Determination Checklist on Pages 1 and 2, and see PDP exemption information below. For further guidance, see Section 1.4 of the BMP Design Manual *in its entirety*.	☐ Standard Project	Standard Project requirements apply, including Standard Project SWQMP. **Complete Standard Project SWQMP.**
	☒ PDP	Standard and PDP requirements apply, including PDP SWQMP. **Complete PDP SWQMP.**
	☐ PDP with ACP	If participating in offsite alternative compliance, **complete Step 6.3 and an ACP SWQMP.**
	☐ PDP Exemption	**Go to Step 1.2 below.**

Step 1.2: Exemption to PDP definitions

Is the project exempt from PDP definitions based on either of the following: ☐ Projects that are only new or retrofit paved sidewalks, bicycle lanes, or trails that meet the following criteria: (i) Designed and constructed to direct storm water runoff to adjacent vegetated areas, or other non-erodible permeable areas; OR (ii) Designed and constructed to be hydraulically disconnected from paved streets or roads [i.e., runoff from the new improvement does not drain directly onto paved streets or roads]; OR (iii) Designed and constructed with permeable pavements or surfaces in accordance with County of San Diego Guidance on Green Infrastructure;	If so: Standard Project requirements apply, AND any additional requirements specific to the type of project. County concurrence with the exemption is required. *Provide discussion and list any additional requirements below in this form.* **Complete Standard Project SWQMP**
☐ Projects that are only retrofitting or redeveloping existing paved alleys, streets or roads that are designed and constructed in accordance with the County of San Diego Guidance on Green Infrastructure.	**Complete Green Streets PDP Exempt SWQMP.**
Discussion / justification, and additional requirements for exceptions to PDP definitions, if applicable:	

Step 2: Construction Storm Water BMP Checklist

Minimum Required Standard Construction Storm Water BMPs		
If you answer "Yes" to any of the questions below, your project is subject to Table 1 on the following page (Minimum Required Standard Construction Stormwater BMPs). As noted in Table 1, please select at least the minimum number of required BMPs, or as many as are feasible for your project. If no BMP is selected, an explanation must be given in the box provided. The following questions are intended to aid in determining construction BMP requirements for your project. **Note: All selected BMPs below must be included on the BMP plan incorporated into the construction plan sets.**		
1. Will there be soil disturbing activities that will result in exposed soil areas? (This includes minor grading and trenching.) **Reference Table 1 Items A, B, D, and E** Note: Soil disturbances NOT considered significant include, but are not limited to, change in use, mechanical/electrical/plumbing activities, signs, temporary trailers, interior remodeling, and minor tenant improvement.	☒Yes	☐No
2. Will there be asphalt paving, including patching? **Reference Table 1 Items D and F**	☒Yes	☐No
3. Will there be slurries from mortar mixing, coring, or concrete saw cutting? **Reference Table 1 Items D and F**	☐Yes	☐No
4. Will there be solid wastes from concrete demolition and removal, wall construction, or form work? **Reference Table 1 Items D and F**	☐Yes	☐No
5. Will there be stockpiling (soil, compost, asphalt, concrete, solid waste) for over 24 hours? **Reference Table 1 Items D and F**	☐Yes	☐No
6. Will there be dewatering operations? **Reference Table 1 Items C and D**	☐Yes	☐No
7. Will there be temporary on-site storage of construction materials, including mortar mix, raw landscaping and soil stabilization materials, treated lumber, rebar, and plated metal fencing materials? **Reference Table 1 Items E and F**	☐Yes	☐No
8. Will trash or solid waste product be generated from this project? **Reference Table 1 Item F**	☒Yes	☐No
9. Will construction equipment be stored on site (e.g.: fuels, oils, trucks, etc.?) **Reference Table 1 Item F**	☐Yes	☐No
10. Will Portable Sanitary Services ("Porta-potty") be used on the site? **Reference Table 1 Item F**	☐Yes	☐No

Table 1. Construction Storm Water BMP Checklist

Minimum Required Best Management Practices (BMPs)	CALTRANS SW Handbook[4] Detail or County Std. Detail	✔ BMP Selected	Reference sheet No.'s where each selected BMP is shown on the plans. If no BMP is selected, an explanation must be provided.
A. Select Erosion Control Method for Disturbed Slopes (choose at least one for the appropriate season)			
Vegetation Stabilization Planting[5] (Summer)	SS-2, SS-4	☐	Will be revised in future submittal as the project design and construction methods are finalized.
Hydraulic Stabilization Hydroseeding[2] (Summer)	SS-4	☒	
Bonded Fiber Matrix or Stabilized Fiber Matrix[6] (Winter)	SS-3	☒	
Physical Stabilization Erosion Control Blanket[3] (Winter)	SS-7	☒	
B. Select erosion control method for disturbed flat areas (slope < 5%) (choose at least one)			
County Standard Lot Perimeter Protection Detail	PDS 659[7], SC-2	☐	Will be revised in future submittal as the project design and construction methods are finalized.
Will use erosion control measures from Item A on flat areas also	SS-3, 4, 7	☒	
County Standard Desilting Basin (must treat all site runoff)	PDS 660[8], SC-2	☐	
Mulch, straw, wood chips, soil application	SS-6, SS-8	☒	

4 State of California Department of Transportation (Caltrans). 2003. Storm Water Quality Handbooks, Construction Site Best Management Practices (BMPs) Manual. March. Available online at: http://www.dot.ca.gov/hq/construc/stormwater/manuals.htm.

5 If Vegetation Stabilization (Planting or Hydroseeding) is proposed for erosion control it may be installed between May 1st and August 15th. Slope irrigation is in place and needs to be operable for slopes >3 feet. Vegetation must be watered and established prior to October 1st. The owner must implement a contingency physical BMP by August 15th if vegetation establishment does not occur by that date. If landscaping is proposed, erosion control measures must also be used while landscaping is being established. Established vegetation must have a subsurface mat of intertwined mature roots with a uniform vegetative coverage of 70 percent of the natural vegetative coverage or more on all disturbed areas.

6 All slopes over three feet must have established vegetative cover prior to final permit approval.

7 County of San Diego, Planning & Development Services. 2012. Standard Lot Perimeter Protection Design System. Building Division. PDS 659. Available online at http://www.sandiegocounty.gov/pds/docs/pds659.pdf.

8 County of San Diego, Planning & Development Services. 2012. County Standard Desilting Basin for Disturbed Areas of 1 Acre or Less Building Division. PDS 659. Available online at http://www.sandiegocounty.gov/pds/docs/pds660.pdf.

Table 1. Construction Storm Water BMP Checklist (continued)

Minimum Required Best Management Practices (BMPs)	CALTRANS SW Handbook Detail or County Std. Detail	✔ BMP Selected	Reference sheet No.'s where each selected BMP is shown on the plans. If no BMP is selected, an explanation must be provided.
C. If runoff or dewatering operation is concentrated, velocity must be controlled using an energy dissipater			
Energy Dissipater Outlet Protection[9]	SS-10	☒	
D. Select sediment control method for all disturbed areas (choose at least one)			
Silt Fence	SC-1	☒	Will be revised in future submittal as the project design and construction methods are finalized.
Fiber Rolls (Straw Wattles)	SC-5	☒	
Gravel & Sand Bags	SC-6 & 8	☒	
Dewatering Filtration	NS-2	☐	
Storm Drain Inlet Protection	SC-10	☒	
Engineered Desilting Basin (sized for 10-year flow)	SC-2	☐	
E. Select method for preventing offsite tracking of sediment (choose at least one)			
Stabilized Construction Entrance	TC-1	☒	Will be revised in future submittal as the project design and construction methods are finalized.
Construction Road Stabilization	TC-2	☐	
Entrance/Exit Tire Wash	TC-3	☐	
Entrance/Exit Inspection & Cleaning Facility	TC-1	☐	
Street Sweeping and Vacuuming	SC-7	☒	
F. Select the general site management BMPs			
F.1 Materials Management			
Material Delivery & Storage	WM-1	☒	Will be revised in future submittal as the project design and construction methods are finalized.
Spill Prevention and Control	WM-4	☒	
F.2 Waste Management[10]			
Waste Management Concrete Waste Management	WM-8	☒	Will be revised in future submittal as the project design and construction methods are finalized.
Solid Waste Management	WM-5	☒	
Sanitary Waste Management	WM-9	☒	
Hazardous Waste Management	WM-6	☒	

Note: The Construction General Permit (Order No. 2009-0009-DWQ) also requires all projects not subject to the BMP Design Manual to comply with runoff reduction requirements through the implementation of post-construction BMPs as described in Section XIII of the order.

[9] Regional Standard Drawing D-40 – Rip Rap Energy Dissipater is also acceptable for velocity reduction.

[10] Not all projects will have every waste identified. The applicant is responsible for identifying wastes that will be onsite and applying the appropriate BMP. For example, if concrete will be used, BMP WM-8 must be selected.

Step 3: County of San Diego PDP SWQMP Site Information Checklist

Step 3.1: Description of Existing Site Condition

Project Watershed (Complete Hydrologic Unit, Area, and Subarea Name with Numeric Identifier)	Hydrologic Unit: Sweetwater, 909.2 Subarea: Jamacha, 909.21

Current Status of the Site (select all that apply):

- ☐ Existing development
- ☐ Previously graded but not built out
- ☐ Demolition completed without new construction
- ☒ Agricultural or other non-impervious use
- ☐ Vacant, undeveloped/natural

Description / Additional Information:
See below existing project site description

Existing Land Cover Includes (select all that apply and provide each area on site):

- ☒ Vegetative Cover 5.4 Acres (235,224 Square Feet)
- ☒ Non-Vegetated Pervious Areas 4.2 Acres (182,952 Square Feet)
- ☒ Impervious Areas 0.3 Acres (13,068 Square Feet)

Description / Additional Information:

Underlying Soil belongs to Hydrologic Soil Group (select all that apply):

- ☐ NRCS Type A
- ☐ NRCS Type B
- ☒ NRCS Type C
- ☐ NRCS Type D

Approximate Depth to Groundwater (GW) (or N/A if no infiltration is used): N/A

- ☐ GW Depth < 5 feet
- ☐ 5 feet < GW Depth < 10 feet
- ☐ 10 feet < GW Depth < 20 feet
- ☒ GW Depth > 20 feet

Existing Natural Hydrologic Features (select all that apply):

- ☒ Watercourses
- ☐ Seeps
- ☐ Springs
- ☐ Wetlands
- ☐ None
- ☐ Other

Description / Additional Information:
A natural unnamed natural channel to the north of the project site flows westerly and confluences with Steele Canyon Creek. The project site will discharge via a proposed storm drain and rip-rap pad into the unnamed channel.

Step 3.2: Description of Existing Site Drainage Patterns

How is storm water runoff conveyed from the site? At a minimum, this description should answer:

(1) Whether existing drainage conveyance is natural or urban;
(2) Is runoff from offsite conveyed through the site? if yes, quantify all offsite drainage areas, design flows, and locations where offsite flows enter the project site, and summarize how such flows are conveyed through the site;
(3) Provide details regarding existing project site drainage conveyance network, including any existing storm drains, concrete channels, swales, detention facilities, storm water treatment facilities, natural or constructed channels; and
(4) Identify all discharge locations from the existing project site along with a summary of conveyance system size and capacity for each of the discharge locations. Provide summary of the pre-project drainage areas and design flows to each of the existing runoff discharge locations.

Describe existing site drainage patterns:

1. The project area is comprised of rolling hills and thin vegetation. The project is located on undeveloped land. Mobile homes lie west of the project and there is a proposed housing projected to the east. Low density homes lie north and south of the project.
2. Off-site runoff sheet flows onto Jefferson Road from the east and is conveyed northerly through asphalt gutter on the east side of the street before entering an existing culvert and continuing off-site through an unnamed channel until it confluences with Steele Canyon Creek. Although the runoff flows on Jefferson Road, it does not seem to enter the proposed project site on the other side of the road.
3. The only drainage conveyance system that exists on-site consists of two asphalt gutters on both sides of Jefferson Road that conveys runoff north until it reaches the unnamed creek and existing culvert or southerly until it reaches Campo Road. A majority of the existing runoff sheet flows northwesterly through the existing adjacent mobile home park or directly into Steele Canyon Creek.
4. For detailed existing condition drainage areas and peak flow rates, refer to the report titled, “Drainage Study for Jamul Retail Center,” prepared by Rick Engineering Company and dated July 10, 2018, or any revision thereof.

Step 3.3: Description of Proposed Site Development

Project Description / Proposed Land Use and/or Activities:
The project proposes to develop the site into two separate lots for commercial/retail use. One of these lots will include the Tractor Supply Company and the other will be used as a self-storage facility. The project also proposes improvements to west half of Jefferson Road on the east side of the project.

List/describe proposed impervious features of the project (e.g., buildings, roadways, parking lots, courtyards, athletic courts, other impervious features):
Impervious features include the roadway widening to Jefferson Road, a large building on each of the two separate lots as well as areas for parking and an area reserved for permanent tractor display.

List/describe proposed pervious features of the project (e.g., landscape areas):
Pervious features of the project include decomposed granite (DG) sidewalks along the west side of Jefferson Road and parking areas adjacent to the self-storage area. There will also be landscape areas adjacent to the parking areas and areas reserved for three biofiltration basins.

Does the project include grading and changes to site topography?
☒Yes
☐No

Description / Additional Information:
The proposed grading changes will be to fill on top of the overall existing slope that ranges from 10-30% and create a flat pad elevation for the buildings and parking lots

Insert acreage or square feet for the different land cover types in the table below:

Change in Land Cover Type Summary			
Land Cover Type	Existing (acres or ft^2)	Proposed (acres or ft^2)	Percent Change
Vegetation	5.4 acres	3.4	-37%
Pervious (non-vegetated)	4.2 acres	0.5	-88%
Impervious	0.3 acres	6.0	+ 190%

Step 3.4: Description of Proposed Site Drainage Patterns

Does the project include changes to site drainage (e.g., installation of new storm water conveyance systems)?

☒Yes
☐No

If yes, provide details regarding the proposed project site drainage conveyance network, including storm drains, concrete channels, swales, detention facilities, storm water treatment facilities, natural or constructed channels, and the method for conveying offsite flows through or around the proposed project site. Identify all discharge locations from the proposed project site along with a summary of the conveyance system size and capacity for each of the discharge locations. Provide a summary of pre- and post-project drainage areas and design flows to each of the runoff discharge locations. Reference the drainage study for detailed calculations.

Describe proposed site drainage patterns:
The project will have two primary drainage systems between the two lots and widening of Jefferson Road. The southerly lot where the tractor supply will be located will have a drainage system consisting of multiple catch basins and curb inlets that collect runoff and direct it into two biofiltration basins (BMPs 2 and 3). The northern lot where the self-storage area is proposed will primarily have surface conveyance through ribbon gutters into catch basins that will direct runoff into one biofiltration basin (BMP 1). The two storm drain systems will confluence downstream of the BMPs within the northerly lot and share a single outfall at the northern existing unnamed channel that flows westerly into Steele Canyon Creek.

Please refer to the report titled, “Drainage Study for Jamul Retail Center,” dated October 10, 2018, or any revision thereof, prepared by Rick Engineering Company (J-18145), for additional drainage information.

Step 3.5: Potential Pollutant Source Areas

Identify whether any of the following features, activities, and/or pollutant source areas will be present (select all that apply). Select "Other" if the project is a phased development and provide a description:

- ☒ On-site storm drain inlets
- ☐ Interior floor drains and elevator shaft sump pumps
- ☐ Interior parking garages
- ☒ Need for future indoor & structural pest control
- ☒ Landscape/Outdoor Pesticide Use
- ☐ Pools, spas, ponds, decorative fountains, and other water features
- ☐ Food service
- ☒ Refuse areas
- ☐ Industrial processes
- ☒ Outdoor storage of equipment or materials
- ☐ Vehicle and Equipment Cleaning
- ☐ Vehicle/Equipment Repair and Maintenance
- ☐ Fuel Dispensing Areas
- ☐ Loading Docks
- ☒ Fire Sprinkler Test Water
- ☒ Miscellaneous Drain or Wash Water
- ☒ Plazas, sidewalks, and parking lots
- ☐ Other (provide description)

Description / Additional Information:

No interior floor drains, shaft pumps, parking garages, pesticide use, water features, industrial process, vehicle cleaning, vehicle repair, or fuel dispensing areas are anticipated.

Step 3.6: Identification and Narrative of Receiving Water and Pollutants of Concern

Describe flow path of storm water from the project site discharge location(s), through urban storm conveyance systems as applicable, to receiving creeks, rivers, and lagoons as applicable, and ultimate discharge to the Pacific Ocean (or bay, lagoon, lake or reservoir, as applicable): From the project site discharge location, runoff is conveyed through a natural unnamed channel flowing westerly where it confluences with Steele Canyon Creek, then Sweetwater River and ultimately the San Diego Bay.

List any 303(d) impaired water bodies[11] within the path of storm water from the project site to the Pacific Ocean (or bay, lagoon, lake or reservoir, as applicable), identify the pollutant(s)/stressor(s) causing impairment, and identify any TMDLs and/or Highest Priority Pollutants from the WQIP for the impaired water bodies:

303(d) Impaired Water Body	Pollutant(s)/Stressor(s)	TMDLs / WQIP Highest Priority Pollutant
Sweetwater River, Lower	*Enterococcus* *Fecal Coliform* *Phosphorus* *Selenium* *Total Dissolved Solids* *Total Nitrogen as N* *Toxicity*	*Estimated TMDL Completion:2021* *Estimated TMDL Completion: 2021* *Estimated TMDL Completion: 2021* *Estimated TMDL Completion: 2021* *Estimated TMDL Completion: 2021* *Estimated TMDL Completion: 2021* *Estimated TMDL Completion: 2021*
San Diego Bay	*PCBs (Polychlorinated biphenyls*	*Estimated TMDL Completion: 2019*

Identification of Project Site Pollutants*

*Identification of project site pollutants below is only required if flow-thru treatment BMPs are implemented onsite in lieu of retention or biofiltration BMPs. Note the project must also participate in an alternative compliance program (unless prior lawful approval to meet earlier PDP requirements is demonstrated).

Identify pollutants expected from the project site based on all proposed use(s) of the site (see BMP Design Manual Appendix B.6):

Pollutant	Not Applicable to the Project Site	Anticipated from the Project Site	Also a Receiving Water Pollutant of Concern
Sediment	☐	☐	☐
Nutrients	☐	☐	☐
Heavy Metals	☐	☐	☐
Organic Compounds	☐	☐	☐
Trash & Debris	☐	☐	☐
Oxygen Demanding Substances	☐	☐	☐

[11] The current list of Section 303(d) impaired water bodies can be found at http://www.waterboards.ca.gov/water_issues/programs/water_quality_assessment/#impaired

Oil & Grease	☐	☐	☐
Bacteria & Viruses	☐	☐	☐
Pesticides	☐	☐	☐

Step 3.7: Hydromodification Management Requirements

Do hydromodification management requirements apply (see Section 1.6 of the BMP Design Manual)?

☒Yes, hydromodification management requirements for flow control and preservation of critical coarse sediment yield areas are applicable.

☐No, the project will discharge runoff directly to existing underground storm drains discharging directly to water storage reservoirs, lakes, enclosed embayments, or the Pacific Ocean.

☐No, the project will discharge runoff directly to conveyance channels whose bed and bank are concrete-lined all the way from the point of discharge to water storage reservoirs, lakes, enclosed embayments, or the Pacific Ocean.

☐No, the project will discharge runoff directly to an area identified as appropriate for an exemption by the WMAA[12] for the watershed in which the project resides.

Description / Additional Information (to be provided if a 'No' answer has been selected above):

[12] The Watershed Management Area Analysis (WMAA) is an optional element for inclusion in the Water Quality Improvement Plans (WQIPs) described in the 2013 MS4 Permit [Provision B.3.b.(4)]. It is available online at the Project Clean Water website: http://www.projectcleanwater.org/index.php?option=com_content&view=article&id=248

Step 3.7.1: Critical Coarse Sediment Yield Areas*

***This Section only required if hydromodification management requirements apply**

Projects must satisfy critical coarse sediment yield area (CCSYA) requirements by characterizing the project as one of the scenario-types presented below and satisfying associated criteria. Projects must appropriately satisfy all requirements for identification, avoidance, and bypass, OR may alternatively elect to demonstrate no net impact.

☒ **Scenario 1**: Project is subject to and in compliance with RPO requirements *(without utilization of RPO exemptions 86.604(e)(2)(cc) or 86.604(e)(3) that result in impacts to more than 15% of the project-scale CCSYAs)*.

- ☒ Identify: Project has identified both onsite and upstream CCSYAs as areas that are coarse, ≥25% slope, and ≥50' tall. *(Optional refinement methods may be performed per guidance in Section H.1.2). AND,*
- ☒ Avoid: Project has avoided onsite CCSYAs per existing RPO steep slope encroachment criteria. AND,
- ☒ Bypass: Project has demonstrated that both onsite and upstream CCSYAs are bypassed through or around the project site with a 2 year peak storm velocity of 3 feet per second or greater. OR,
- ☐ No Net Impact: Project does not satisfy all Scenario 1 criteria above and must alternatively demonstrate no net impact to the receiving water.

☐ **Scenario 2**: Project is entirely exempt/not subject to RPO requirements without utilization of RPO exemptions 86.604(e)(2)(cc) or 86.604(e)(3).

- ☐ Identify: Project has identified upstream CCSYAs that are coarse, ≥25% slope, and ≥50' tall. *(Optional refinement methods may be performed per guidance in Section H.1.2). AND,*
- ☐ Avoid: Project is not required to avoid onsite CCSYAs as none were identified in the previous step. AND,
- ☐ Bypass: Project has demonstrated that upstream CCSYAs are bypassed through or around the project site with a 2 year peak storm velocity of 3 feet per second or greater. OR,
- ☐ No Net Impact: Project does not satisfy all Scenario 2 criteria above and must alternatively demonstrate no net impact to the receiving water. *(Skip to next row).*

☐ **Scenario 3**: Project utilizes exemption(s) via RPO Section 86.604(e)(2)(cc) or 86.604(e)(3) and impacts more than 15% of the project-scale CCSYAs.

- ☐ No Net Impact: Project is not eligible for traditional methods of identification, avoidance, and bypass. Project must demonstrate no net impact to the receiving water.

Critical Coarse Sediment Yield Areas Continued
Demonstrate No Net Impact
If the project elects to satisfy CCSYA criteria through demonstration of no net impact to the receiving water. Applicants must identify the methods utilized from the list below and provide supporting documentation in Attachment 2c of the SWQMP. Check all that are applicable. ☐ N/A, the project appropriately identifies, avoids, and bypasses CCSYAs. ☐ Project has performed additional analysis to demonstrate that impacts to CCSYAs satisfy the no net impact standard of Ep/Sp≤1.1. ☐ Project has provided alternate mapping of CCSYAs. ☐ Project has implemented additional onsite hydromodification flow control measures. ☐ Project has implemented an offsite stream rehabilitation project to offset impacts. ☐ Project has implemented other applicant-proposed mitigation measures.

Step 3.7.2: Flow Control for Post-Project Runoff*

*This Section only required if hydromodification management requirements apply
List and describe point(s) of compliance (POCs) for flow control for hydromodification management (see Section 6.3.1). For each POC, provide a POC identification name or number correlating to the project's HMP Exhibit and a receiving channel identification name or number correlating to the project's HMP Exhibit. The project site will be draining to one Point of Compliance identified as POC-1. POC-1 contains all drainage from DMAs 1-5. For comparison purposes, this POC is located along Steele Canyon Creek where all runoff from the pre-development condition will have sheet flowed into the channel. A continuous simulation analysis was prepared to comply with the hydromodification management requirements using EPA SWMM version 5.1 for the default range of flows from the pre-development 0.1Q2 to Q10. Refer to Attachment 2a for flow frequency and flow duration results for HMP modeling.
Has a geomorphic assessment been performed for the receiving channel(s)? ☒ No, the low flow threshold is 0.1Q2 (default low flow threshold) ☐ Yes, the result is the low flow threshold is 0.1Q2 ☐ Yes, the result is the low flow threshold is 0.3Q2 ☐ Yes, the result is the low flow threshold is 0.5Q2 *If a geomorphic assessment has been performed, provide title, date, and preparer:* *Discussion / Additional Information: (optional)*

Step 3.8: Other Site Requirements and Constraints

When applicable, list other site requirements or constraints that will influence storm water management design, such as zoning requirements including setbacks and open space, or local codes governing minimum street width, sidewalk construction, allowable pavement types, and drainage requirements.

Constraints have influenced the location of the single site outfall and after taking these into account it has been determined that the proposed location is the least likely to cause any negative impacts to downstream channels compared to any other on-site location. The constraints are as follows:

-a biologist has recommended against discharging within the dense live oak trees at the northwesterly portion of the property due to constructability and maintenance concerns.

-existing adverse drainage conditions exist at the downstream mobile home community as a result of run-on from the project site.

-no existing storm drain network exists on the property direct runoff to in the ultimate build out condition.

-a Resource Protection Ordinance (RPO) limit on the outer edge of the project boundary restricts development opportunities.

Optional Additional Information or Continuation of Previous Sections As Needed

This space provided for additional information or continuation of information from previous sections as needed.

Step 4: Source Control BMP Checklist

Source Control BMPs

All development projects must implement source control BMPs 4.2.1 through 4.2.6 where applicable and feasible. See Chapter 4.2 and Appendix E of the County BMP Design Manual for information to implement source control BMPs shown in this checklist.

Answer each category below pursuant to the following:

- "Yes" means the project will implement the source control BMP as described in Chapter 4.2 and/or Appendix E of the County BMP Design Manual. Discussion / justification is not required.
- "No" means the BMP is applicable to the project but it is not feasible to implement. Discussion / justification must be provided.
- "N/A" means the BMP is not applicable at the project site because the project does not include the feature that is addressed by the BMP (e.g., the project has no outdoor materials storage areas). Discussion / justification must be provided.

Source Control Requirement	Applied?		
4.2.1 Prevention of Illicit Discharges into the MS4	☒Yes	☐No	☐N/A
Discussion / justification if 4.2.1 not implemented:			
4.2.2 Storm Drain Stenciling or Signage	☒Yes	☐No	☐N/A
Discussion / justification if 4.2.2 not implemented:			
4.2.3 Protect Outdoor Materials Storage Areas from Rainfall, Run-On, Runoff, and Wind Dispersal	☒Yes	☐No	☐N/A
Discussion / justification if 4.2.3 not implemented:			
4.2.4 Protect Materials Stored in Outdoor Work Areas from Rainfall, Run-On, Runoff, and Wind Dispersal	☐Yes	☐No	☒N/A
Discussion / justification if 4.2.4 not implemented: No outdoor work areas are proposed at this time.			

Source Control Requirement	Applied?		
4.2.5 Protect Trash Storage Areas from Rainfall, Run-On, Runoff, and Wind Dispersal	☒Yes	☐No	☐N/A
Discussion / justification if 4.2.5 not implemented:			
4.2.6 Additional BMPs Based on Potential Sources of Runoff Pollutants (must answer for each source listed below):			
☒ A. On-site storm drain inlets	☒Yes	☐No	☐N/A
☒ B. Interior floor drains and elevator shaft sump pumps	☐Yes	☐No	☒N/A
☒ C. Interior parking garages	☐Yes	☐No	☒N/A
☒ D. Need for future indoor & structural pest control	☒Yes	☐No	☐N/A
☒ E. Landscape/outdoor pesticide use	☒Yes	☐No	☐N/A
☒ F. Pools, spas, ponds, fountains, and other water features	☐Yes	☐No	☒N/A
☒ G. Food service	☐Yes	☐No	☒N/A
☒ H. Refuse areas	☒Yes	☐No	☐N/A
☒ I. Industrial processes	☐Yes	☐No	☒N/A
☒ J. Outdoor storage of equipment or materials	☒Yes	☐No	☐N/A
☒ K. Vehicle and equipment cleaning	☐Yes	☐No	☒N/A
☒ L. Vehicle/equipment repair and maintenance	☐Yes	☐No	☒N/A
☒ M. Fuel dispensing areas	☐Yes	☐No	☒N/A
☒ N. Loading docks	☐Yes	☐No	☒N/A
☒ O. Fire sprinkler test water	☒Yes	☐No	☐N/A
☒ P. Miscellaneous drain or wash water	☒Yes	☐No	☐N/A
☒ Q. Plazas, sidewalks, and parking lots	☒Yes	☐No	☐N/A
Discussion / justification if 4.2.6 not implemented. Clearly identify which sources of runoff pollutants are discussed. Justification must be provided for <u>all</u> "No" answers shown above. No interior floor drains, shaft pumps, parking garages, pesticide use, water features, industrial process, vehicle cleaning, vehicle repair, or fuel dispensing areas is proposed for this project.			

Note: Show all source control measures described above that are included in design capture volume calculations in the plan sheets of Attachment 5.

Step 5: Site Design BMP Checklist

Site Design BMPs
All development projects must implement site design BMPs SD-A through SD-H where applicable and feasible. See Chapter 4.3 and Appendix E of the County BMP Design Manual for information to implement site design BMPs shown in this checklist. Answer each category below pursuant to the following: • "Yes" means the project will implement the site design BMP as described in Chapter 4.3 and/or Appendix E of the County BMP Design Manual. Discussion / justification is not required. • "No" means the BMP is applicable to the project but it is not feasible to implement. Discussion / justification must be provided. • "N/A" means the BMP is not applicable at the project site because the project does not include the feature that is addressed by the BMP (e.g., the project site has no existing natural areas to conserve). Discussion / justification must be provided.

Site Design Requirement	Applied?		
4.3.1 Maintain Natural Drainage Pathways and Hydrologic Features	☒Yes	☐No	☐N/A
Discussion / justification if 4.3.1 not implemented: It should be noted that due to riparian and environmental areas, the project will be discharging into the natural unnamed tributary for Steele Canyon via a proposed outfall. This outfall location minimizes the impacts to the riparian areas.			
4.3.2 Conserve Natural Areas, Soils, and Vegetation	☒Yes	☐No	☐N/A
Discussion / justification if 4.3.2 not implemented:			
4.3.3 Minimize Impervious Area	☒Yes	☐No	☐N/A
Discussion / justification if 4.3.3 not implemented:			
4.3.4 Minimize Soil Compaction	☒Yes	☐No	☐N/A
Discussion / justification if 4.3.4 not implemented:			
4.3.5 Impervious Area Dispersion	☐Yes	☐No	☒N/A
Discussion / justification if 4.3.5 not implemented: No areas are proposed at this time that serves the purpose of impervious area dispersion.			

Site Design Requirement	Applied?		
4.3.6 Runoff Collection	☐Yes	☐No	☒N/A
Discussion / justification if 4.3.6 not implemented: No pervious pavements, green roofs, or small subcatchments are proposed			
4.3.7 Landscaping with Native or Drought Tolerant Species	☒Yes	☐No	☐N/A
Discussion / justification if 4.3.7 not implemented:			
4.3.8 Harvesting and Using Precipitation	☐Yes	☒No	☐N/A
Discussion / justification if 4.3.8 not implemented: Harvest and Use BMPs are deemed infeasible, please see Attachment 1a			

Note: Show all site design measures described above that are included in design capture volume calculations in the plan sheets of Attachment 5.

Step 6: PDP Structural BMPs

All PDPs must implement structural BMPs for storm water pollutant control (see Chapter 5 of the BMP Design Manual). Selection of PDP structural BMPs for storm water pollutant control must be based on the selection process described in Chapter 5. PDPs subject to hydromodification management requirements must also implement structural BMPs for flow control for hydromodification management (see Chapter 6 of the BMP Design Manual). Both storm water pollutant control and flow control for hydromodification management can be achieved within the same structural BMP(s).

PDP structural BMPs must be verified by the County at the completion of construction. This may include requiring the project owner or project owner's representative and engineer of record to certify construction of the structural BMPs (see Section 1.12 of the BMP Design Manual). PDP structural BMPs must be maintained into perpetuity, and the County must confirm the maintenance (see Section 7 of the BMP Design Manual).

Use this section to provide narrative description of the general strategy for structural BMP implementation at the project site in the box below. Then complete the PDP structural BMP summary information sheet (Step 6.2) for each structural BMP within the project (copy the BMP summary information sheet [Step 6.2] as many times as needed to provide summary information for each individual structural BMP).

Step 6.1: Description of structural BMP strategy

Describe the general strategy for structural BMP implementation at the site. This information must describe how the steps for selecting and designing storm water pollutant control BMPs presented in Section 5.1 of the BMP Design Manual were followed, and the results (type of BMPs selected). For projects requiring hydromodification flow control BMPs, indicate whether pollutant control and flow control BMPs are integrated or separate. At the end of this discussion provide a summary of all the structural BMPs within the project including the type and number.

Three structural BMPs (BMP-1, 2 and 3), are proposed for both stormwater pollutant control and hydromodification management flow control of drainage from the project site. Selection of the BMP type was selected using Figures 5-1 and 5-2 from the County BMP Design Manual. DMA-1, 2, and 3 contains impervious surfaces; therefore, the selection begins at Step 1B. DMA-4 and DMA-5 drain directly to the northerly channel, contain impervious area of less than 5%, are composed of amended soils that do not require regular application of fertilizer/pesticides, and are hydraulically separate from other DMA's, thus they are identified as self-mitigating DMAs as outlined in Section 5.2.1 in the County BMP Design Manual.

After calculating the Design Capture Volume, Step 2 was completed to determine Harvest and Use feasibility. Based on low proposed landscape irrigation water demand for the site, it was determined that Harvest and Use is infeasible (refer to Form B.3.1 provided in Attachment 1a).

(Continue on following page as necessary.)

Description of structural BMP strategy continued
(Page reserved for continuation of description of general strategy for structural BMP implementation at the site)

(Continued from previous page)

Pursuant to the project's geotechnical report prepared by C.W. La Monte Company, Inc.(refer to Attachment 7 for a copy of the report), full infiltration is not feasible for proposed BMPs. Additionally, per coordination with the geotechnical engineer, partial infiltration is not allowed within areas of fill; therefore, BMPs 1 and 2 do not provide partial infiltration. BMP 3 currently assumes no infiltration, which is conservative. Partial infiltration will be re-evaluated through coordination with the project's Geotech during final engineering and form I-8 will be updated at that time. Storm water generated from the project will be managed by the proposed BMPs and will ultimately discharge into the existing unnamed channel to the north of the project.

In step 4 it was determined that BMP-1, 2 and 3 can be designed to treat the full DCV and satisfy the minimum 3% footprint requirement. It should be noted that a mid-flow orifice is provided 12-inches above the bottom of the proposed BMPs for HMP purposes (i.e., to meet the low-flow threshold (0.1Q2) requirements). The proposed BMPs more than adequately provide the required DCV with only 6-inches of surface ponding; however, the additional 6-inches of ponding were required for HMP purposes. Furthermore, due to low-flow threshold requirements for HMP, a low-flow restrictor was necessary for the proposed biofiltration BMPs, which causes the drawdown time for BMP 1 to be in excess of 24-hours. The drawdown time for all BMPs will be finalized during the final engineering phase, and if it is in excess of 24-hrs, it will be coordinated with the County and the project's Landscape Architect. It should be noted that although Worksheet B5-1 states that BMP 1 does not meet the water quality volume, it has more than enough static storage to manage the DCV for DMA 1. BMP 1 provides and bottom footprint that exceeds the minimum 3% sizing criteria and provides 6-inches of water quality surface ponding.

Additionally, It should be noted that approximately 950 S.F. of impervious area of required impervious area of Jefferson Road cannot be feasibly treated due to site constraints. However, approximately 12,000 S.F. of "Excess Treated" impervious area is managed within the project's BMPs, which more than offsets the required untreated area. The "Excess Treated" area is comprised of existing roadway on Jefferson Road that will be overlaid and is therefore not required to be treated as part of the project.

Step 6.2: Structural BMP Checklist

(Copy this page as needed to provide information for each individual proposed structural BMP)	
Structural BMP ID No. BMP-1	
Construction Plan Sheet No.	
Type of structural BMP: ☐ Retention by harvest and use (HU-1) ☐ Retention by infiltration basin (INF-1) ☐ Retention by bioretention (INF-2) ☐ Retention by permeable pavement (INF-3) ☐ Partial retention by biofiltration with partial retention (PR-1) ☒ Biofiltration (BF-1) ☐ Biofiltration with Nutrient Sensitive Media Design (BF-2) ☐ Proprietary Biofiltration (BF-3) meeting all requirements of Appendix F ☐ Flow-thru treatment control with prior lawful approval to meet earlier PDP requirements (provide BMP type/description in discussion section below) ☐ Flow-thru treatment control included as pre-treatment/forebay for an onsite retention or biofiltration BMP (provide BMP type/description and indicate which onsite retention or biofiltration BMP it serves in discussion section below) ☐ Flow-thru treatment control with alternative compliance (provide BMP type/description in discussion section below) ☐ Detention pond or vault for hydromodification management ☐ Other (describe in discussion section below)	
Purpose: ☐ Pollutant control only ☐ Hydromodification control only ☒ Combined pollutant control and hydromodification control ☐ Pre-treatment/forebay for another structural BMP ☒ Other (describe in discussion section below)	
Who will certify construction of this BMP? Provide name and contact information for the party responsible to sign BMP verification forms (See Section 1.12 of the BMP Design Manual)	
Who will be the final owner of this BMP?	☐ HOA ☒ Property Owner ☐ County ☐ Other (describe)
Who will maintain this BMP into perpetuity?	☐ HOA ☒ Property Owner ☐ County ☐ Other (describe)
What Category (1-4) is the Structural BMP? Refer to the Category definitions in Section 7.3 of the BMP DM. Attach the appropriate maintenance agreement in Attachment 3.	2
Discussion (as needed): Also provides Detention for 100-yr storm event *(Continue on subsequent pages as necessary)*	

Step 6.3: Offsite Alternative Compliance Participation Form

PDP INFORMATION	
Record ID:	N/A
Assessor's Parcel Number(s) [APN(s)]	N/A
What are your PDP Pollutant Control Debits? *See Attachment 1 of the PDP SWQMP	N/A
What are your PDP HMP Debits? (if applicable) *See Attachment 2 of the PDP SWQMP	N/A
ACP Information	
Record ID:	N/A
Assessor's Parcel Number(s) [APN(s)]	N/A
Project Owner/Address	N/A
What are your ACP Pollutant Control Credits? *See Attachment 1 of the ACP SWQMP	N/A
What are your ACP HMP Debits? (if applicable) *See Attachment 2 of the ACP SWQMP	N/A
Is your ACP in the same watershed as your PDP? ☐ Yes ☐ No	Will your ACP project be completed prior to the completion of the PDP? ☐ Yes ☐ No
Does your ACP account for all Deficits generated by the PDP? ☐ Yes ☐ No (PDP and/or ACP must be redesigned to account for all deficits generated by the PDP.	What is the difference between your PDP debits and ACP Credits? *(ACP Credits -Total PDP Debits = Total Earned Credits)

Step 6.2: Structural BMP Checklist

(Copy this page as needed to provide information for each individual proposed structural BMP)	
Structural BMP ID No. BMP-2	
Construction Plan Sheet No.	
Type of structural BMP: ☐ Retention by harvest and use (HU-1) ☐ Retention by infiltration basin (INF-1) ☐ Retention by bioretention (INF-2) ☐ Retention by permeable pavement (INF-3) ☐ Partial retention by biofiltration with partial retention (PR-1) ☒ Biofiltration (BF-1) ☐ Biofiltration with Nutrient Sensitive Media Design (BF-2) ☐ Proprietary Biofiltration (BF-3) meeting all requirements of Appendix F ☐ Flow-thru treatment control with prior lawful approval to meet earlier PDP requirements (provide BMP type/description in discussion section below) ☐ Flow-thru treatment control included as pre-treatment/forebay for an onsite retention or biofiltration BMP (provide BMP type/description and indicate which onsite retention or biofiltration BMP it serves in discussion section below) ☐ Flow-thru treatment control with alternative compliance (provide BMP type/description in discussion section below) ☐ Detention pond or vault for hydromodification management ☐ Other (describe in discussion section below)	
Purpose: ☐ Pollutant control only ☐ Hydromodification control only ☒ Combined pollutant control and hydromodification control ☐ Pre-treatment/forebay for another structural BMP ☒ Other (describe in discussion section below)	
Who will certify construction of this BMP? Provide name and contact information for the party responsible to sign BMP verification forms (See Section 1.12 of the BMP Design Manual)	
Who will be the final owner of this BMP?	☐ HOA ☒ Property Owner ☐ County ☐ Other (describe)
Who will maintain this BMP into perpetuity?	☐ HOA ☒ Property Owner ☐ County ☐ Other (describe)
What Category (1-4) is the Structural BMP? Refer to the Category definitions in Section 7.3 of the BMP DM. Attach the appropriate maintenance agreement in Attachment 3.	2
Discussion (as needed): Also provides Detention for 100-yr storm event *(Continue on subsequent pages as necessary)*	

Step 6.2: Structural BMP Checklist

(Copy this page as needed to provide information for each individual proposed structural BMP)	
Structural BMP ID No. BMP-3	
Construction Plan Sheet No.	
Type of structural BMP: ☐ Retention by harvest and use (HU-1) ☐ Retention by infiltration basin (INF-1) ☐ Retention by bioretention (INF-2) ☐ Retention by permeable pavement (INF-3) ☐ Partial retention by biofiltration with partial retention (PR-1) ☒ Biofiltration (BF-1) ☐ Biofiltration with Nutrient Sensitive Media Design (BF-2) ☐ Proprietary Biofiltration (BF-3) meeting all requirements of Appendix F ☐ Flow-thru treatment control with prior lawful approval to meet earlier PDP requirements (provide BMP type/description in discussion section below) ☐ Flow-thru treatment control included as pre-treatment/forebay for an onsite retention or biofiltration BMP (provide BMP type/description and indicate which onsite retention or biofiltration BMP it serves in discussion section below) ☐ Flow-thru treatment control with alternative compliance (provide BMP type/description in discussion section below) ☐ Detention pond or vault for hydromodification management ☐ Other (describe in discussion section below)	
Purpose: ☐ Pollutant control only ☐ Hydromodification control only ☒ Combined pollutant control and hydromodification control ☐ Pre-treatment/forebay for another structural BMP ☒ Other (describe in discussion section below)	
Who will certify construction of this BMP? Provide name and contact information for the party responsible to sign BMP verification forms (See Section 1.12 of the BMP Design Manual)	
Who will be the final owner of this BMP?	☐ HOA ☒ Property Owner ☐ County ☐ Other (describe)
Who will maintain this BMP into perpetuity?	☐ HOA ☒ Property Owner ☐ County ☐ Other (describe)
What Category (1-4) is the Structural BMP? Refer to the Category definitions in Section 7.3 of the BMP DM. Attach the appropriate maintenance agreement in Attachment 3.	2
Discussion (as needed): Also provides Detention for 100-yr storm event *(Continue on subsequent pages as necessary)*	

ATTACHMENT 1

BACKUP FOR PDP POLLUTANT CONTROL BMPS

This is the cover sheet for Attachment 1.

Indicate which Items are Included behind this cover sheet:

Attachment Sequence	Contents	Checklist
Attachment 1a	Storm Water Pollutant Control Worksheet Calculations -Worksheet B.3-1 (Required) -Worksheet B.1-1 (Required) -Worksheet B.4-1 (if applicable) -Worksheet B.4-2 (if applicable) -Worksheet B.5-1 (if applicable) -Worksheet B.5-2 (if applicable) -Worksheet B.5-3 (if applicable) -Worksheet B.6-1 (if applicable) -Summary Worksheet (optional)	☒ Included
Attachment 1b	Form I-8, Categorization of Infiltration Feasibility Condition (Required unless the project will use harvest and use BMPs) Refer to Appendices C and D of the BMP Design Manual to complete Form I-8.	☒ Included ☐ Not included because the entire project will use harvest and use BMPs
Attachment 1c	DMA Exhibit (Required) See DMA Exhibit Checklist on the back of this Attachment cover sheet.	☒ Included
Attachment 1d	Individual Structural BMP DMA Mapbook (Required) -Place each map on 8.5”x11” paper. -Show at a minimum the DMA, Structural BMP, and any existing hydrologic features within the DMA.	☐ Included

Use this checklist to ensure the required information has been included on the DMA Exhibit:

The DMA Exhibit must identify:

☒ Underlying hydrologic soil group
☒ Approximate depth to groundwater
☒ Existing natural hydrologic features (watercourses, seeps, springs, wetlands)
☒ Critical coarse sediment yield areas to be protected
☒ Existing topography and impervious areas
☒ Existing and proposed site drainage network and connections to drainage offsite
☐ Proposed demolition
☒ Proposed grading
☒ Proposed impervious features
☒ Proposed design features and surface treatments used to minimize imperviousness
☒ Drainage management area (DMA) boundaries, DMA ID numbers, and DMA areas (square footage or acreage), and DMA type (i.e., drains to BMP, self-retaining, or self-mitigating)
☒ Potential pollutant source areas and corresponding required source controls (see Chapter 4, Appendix E.1, and Step 3.5)
☒ Structural BMPs (identify location, structural BMP ID#, type of BMP, and size/detail)

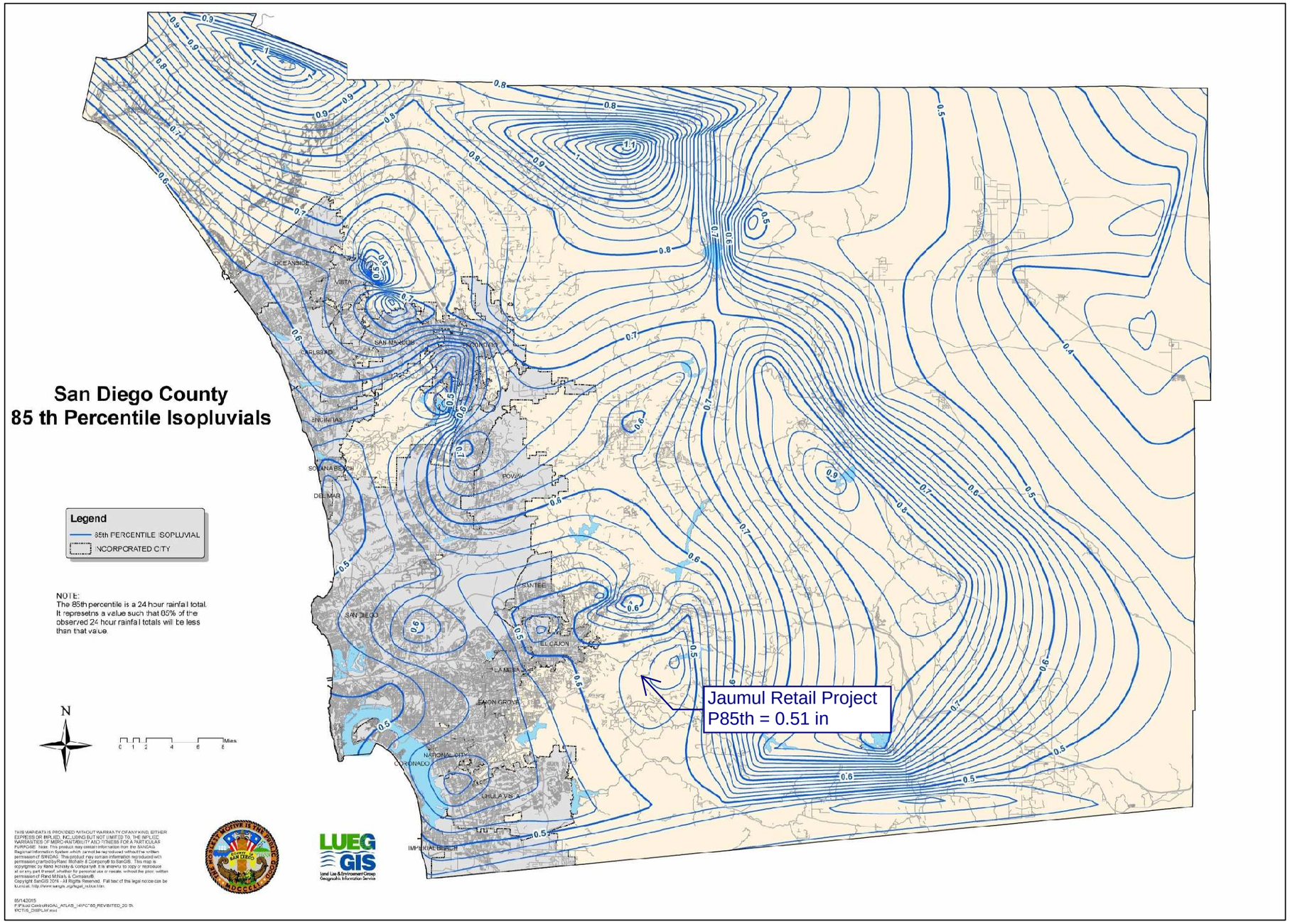


Figure B.1-1: 85th Percentile 24-hour Isopluvial Map

Automated Worksheet B.3-1: Project-Scale BMP Feasibility Analysis (V1.3)

Category	#	Description	Value	Units
Capture & Use Inputs	0	Design Capture Volume for Entire Project Site	10,857	cubic-feet
	1	Proposed Development Type	Retail	unitless
	2	Number of Residents or Employees at Proposed Development	50	#
	3	Total Planted Area within Development	47,698	sq-ft
	4	Water Use Category for Proposed Planted Areas	Low	unitless
Infiltration Inputs	5	Is Average Site Design Infiltration Rate ≤0.500 Inches per Hour?	Yes	yes/no
	6	Is Average Site Design Infiltration Rate ≤0.010 Inches per Hour?	Yes	yes/no
	7	Is Infiltration of the Full DCV Anticipated to Produce Negative Impacts?	Yes	yes/no
	8	Is Infiltration of Any Volume Anticipated to Produce Negative Impacts?	Yes	yes/no
Calculations	9	36-Hour Toilet Use Per Resident or Employee	1.40	cubic-feet
	10	Subtotal: Anticipated 36 Hour Toilet Use	70	cubic-feet
	11	Anticipated 1 Acre Landscape Use Over 36 Hours	52.14	cubic-feet
	12	Subtotal: Anticipated Landscape Use Over 36 Hours	57	cubic-feet
	13	Total Anticipated Use Over 36 Hours	127	cubic-feet
	14	Total Anticipated Use / Design Capture Volume	0.01	cubic-feet
	15	Are Full Capture and Use Techniques Feasible for this Project?	No	unitless
	16	Is Full Retention Feasible for this Project?	No	yes/no
	17	Is Partial Retention Feasible for this Project?	No	yes/no
Result	18	Feasibility Category	5	1, 2, 3, 4, 5

Worksheet B.3-1 General Notes:

A. Applicants may use this worksheet to determine the types of structural BMPs that are acceptable for implementation at their project site (as required in Section 5 of the BMPDM). User input should be provided for yellow shaded cells, values for all other cells will be automatically generated. Projects demonstrating feasibility or potential feasibility via this worksheet are encouraged to incorporate capture and use features in their project.

B. Negative impacts associated with retention may include geotechnical, groundwater, water balance, or other issues identified by a geotechnical engineer and substantiated through completion of Form I-8.

C. Feasibility Category 1: Applicant must implement capture & use, retention, and/or infiltration elements for the entire DCV.

D. Feasibility Category 2: Applicant must implement capture & use elements for the entire DCV.

E. Feasibility Category 3: Applicant must implement retention and/or infiltration elements for all DMAs with Design Infiltration Rates greater than 0.50 in/hr.

F. Feasibility Category 4: Applicant must implement standard unlined biofiltration BMPs sized at ≥3% of the effective impervious tributary area for all DMAs with Design Infiltration Rates of 0.011 to 0.50 in/hr. Applicants may be permitted to implement lined BMPs, reduced size BMPs, and/or specialized biofiltration BMPs provided additional criteria identified in "Supplemental Retention Criteria for Non-Standard Biofiltration BMPs" are satisfied.

G. Feasibility Category 5: Applicant must implement standard lined biofiltration BMPs sized at ≥3% of the effective impervious tributary area for all DMAs with Design Infiltration Rates of 0.010 in/hr or less. Applicants may also be permitted to implement reduced size and/or specialized biofiltration BMPs provided additional criteria identified in "Supplemental Retention Criteria for Non-Standard Biofiltration BMPs" are satisfied.

H. PDPs participating in an offsite alternative compliance program are not held to the feasibility categories presented herein.

Automated Worksheet B.1-1: Calculation of Design Capture Volume (V1.3)

Category	#	Description	*i*	*ii*	*iii*	*iv*	*v*	*vi*	*vii*	*viii*	*ix*	*x*	Units
Standard Drainage Basin Inputs	0	Drainage Basin ID or Name	1	2	3								unitless
	1	Basin Drains to the Following BMP Type	Biofiltration	Biofiltration	Biofiltration								unitless
	2	85th Percentile 24-hr Storm Depth	0.51	0.51	0.51								inches
	3	Design Infiltration Rate Recommended by Geotechnical Engineer	0.000	0.000	0.000								in/hr
	4	Impervious Surfaces Not Directed to Dispersion Area (C=0.90)	140,481	93,654	36,155								sq-ft
	5	Semi-Pervious Surfaces Not Serving as Dispersion Area (C=0.30)	10,035	7,813	19,085								sq-ft
	6	Engineered Pervious Surfaces Not Serving as Dispersion Area (C=0.10)	6,300	3,077	1,388								sq-ft
	7	Natural Type A Soil Not Serving as Dispersion Area (C=0.10)											sq-ft
	8	Natural Type B Soil Not Serving as Dispersion Area (C=0.14)											sq-ft
	9	Natural Type C Soil Not Serving as Dispersion Area (C=0.23)											sq-ft
	10	Natural Type D Soil Not Serving as Dispersion Area (C=0.30)											sq-ft
Dispersion Area, Tree Well & Rain Barrel Inputs (Optional)	11	Does Tributary Incorporate Dispersion, Tree Wells, and/or Rain Barrels?	No	No	No	No	No	No	No	No	No	No	yes/no
	12	Impervious Surfaces **Directed to Dispersion Area** per SD-B (Ci=0.90)											sq-ft
	13	Semi-Pervious Surfaces **Serving as Dispersion Area** per SD-B (Ci=0.30)											sq-ft
	14	Engineered Pervious Surfaces **Serving as Dispersion Area** per SD-B (Ci=0.10)											sq-ft
	15	Natural Type A Soil **Serving as Dispersion Area** per SD-B (Ci=0.10)											sq-ft
	16	Natural Type B Soil **Serving as Dispersion Area** per SD-B (Ci=0.14)											sq-ft
	17	Natural Type C Soil **Serving as Dispersion Area** per SD-B (Ci=0.23)											sq-ft
	18	Natural Type D Soil **Serving as Dispersion Area** per SD-B (Ci=0.30)											sq-ft
	19	Number of Tree Wells Proposed per SD-A											#
	20	Average Mature Tree Canopy Diameter											ft
	21	Number of Rain Barrels Proposed per SD-E											#
	22	Average Rain Barrel Size											gal
Treatment Train Inputs & Calculations	23	Does BMP Overflow to Stormwater Features in Downstream Drainage?	No	No	No	No	No	No	No	No	No	No	unitless
	24	Identify Downstream Drainage Basin Providing Treatment in Series											unitless
	25	Percent of Upstream Flows Directed to Downstream Dispersion Areas											percent
	26	Upstream Impervious Surfaces Directed to Dispersion Area (Ci=0.90)	0	0	0	0	0	0	0	0	0	0	cubic-feet
	27	Upstream Impervious Surfaces Not Directed to Dispersion Area (C=0.90)	0	0	0	0	0	0	0	0	0	0	cubic-feet
Initial Runoff Factor Calculation	28	Total Tributary Area	156,816	104,544	56,628	0	0	0	0	0	0	0	sq-ft
	29	Initial Runoff Factor for Standard Drainage Areas	0.83	0.83	0.68	0.00	0.00	0.00	0.00	0.00	0.00	0.00	unitless
	30	Initial Runoff Factor for Dispersed & Dispersion Areas	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	unitless
	31	Initial Weighted Runoff Factor	0.83	0.83	0.68	0.00	0.00	0.00	0.00	0.00	0.00	0.00	unitless
	32	Initial Design Capture Volume	5,532	3,688	1,637	0	0	0	0	0	0	0	cubic-feet
Dispersion Area Adjustments	33	Total Impervious Area Dispersed to Pervious Surface	0	0	0	0	0	0	0	0	0	0	sq-ft
	34	Total Pervious Dispersion Area	0	0	0	0	0	0	0	0	0	0	sq-ft
	35	Ratio of Dispersed Impervious Area to Pervious Dispersion Area	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	ratio
	36	Adjustment Factor for Dispersed & Dispersion Areas	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	ratio
	37	Runoff Factor After Dispersion Techniques	0.83	0.83	0.68	n/a	n/a	n/a	n/a	n/a	n/a	n/a	unitless
	38	Design Capture Volume After Dispersion Techniques	5,532	3,688	1,637	0	0	0	0	0	0	0	cubic-feet
Tree & Barrel Adjustments	39	Total Tree Well Volume Reduction	0	0	0	0	0	0	0	0	0	0	cubic-feet
	40	Total Rain Barrel Volume Reduction	0	0	0	0	0	0	0	0	0	0	cubic-feet
Results	41	Final Adjusted Runoff Factor	0.83	0.83	0.68	0.00	0.00	0.00	0.00	0.00	0.00	0.00	unitless
	42	Final Effective Tributary Area	130,157	86,772	38,507	0	0	0	0	0	0	0	sq-ft
	43	Initial Design Capture Volume Retained by Site Design Elements	0	0	0	0	0	0	0	0	0	0	cubic-feet
	44	Final Design Capture Volume Tributary to BMP	5,532	3,688	1,637	0	0	0	0	0	0	0	cubic-feet

Worksheet B.1-1 General Notes:

A. Applicants may use this worksheet to calculate design capture volumes for up to 10 drainage areas User input must be provided for yellow shaded cells, values for all other cells will be automatically generated, errors/notifications will be highlighted in red and summarized below. Upon completion of this worksheet, proceed to the appropriate BMP Sizing worksheet(s).

Automated Worksheet B.5-1: Sizing Lined or Unlined Biofiltration BMPs (V1.3)

Category	#	Description	*i*	*ii*	*iii*	*iv*	*v*	*vi*	*vii*	*viii*	*ix*	*x*	Units
BMP Inputs	0	Drainage Basin ID or Name	1	2	3	-	-	-	-	-	-	-	sq-ft
	1	Design Infiltration Rate Recommended by Geotechnical Engineer	0.000	0.000	0.000	-	-	-	-	-	-	-	in/hr
	2	Effective Tributary Area	130,157	86,772	38,507	-	-	-	-	-	-	-	sq-ft
	3	Minimum Biofiltration Footprint Sizing Factor	0.030	0.030	0.030	-	-	-	-	-	-	-	ratio
	4	Design Capture Volume Tributary to BMP	5,532	3,688	1,637	-	-	-	-	-	-	-	cubic-feet
	5	Is Biofiltration Basin Impermeably Lined or Unlined?	Lined	Lined	Lined								unitless
	6	Provided Biofiltration BMP Surface Area	6,300	3,077	1,388								sq-ft
	7	Provided Surface Ponding Depth	6	6	6								inches
	8	Provided Soil Media Thickness	27	27	27								inches
	9	Provided Depth of Gravel Above Underdrain Invert	24	24	24								inches
	10	Diameter of Underdrain or Hydromod Orifice (Select Smallest)	0.69	0.69	0.50								inches
	11	Provided Depth of Gravel Below the Underdrain	3	3	3								inches
Retention Calculations	12	Volume Infiltrated Over 6 Hour Storm	0	0	0	0	0	0	0	0	0	0	cubic-feet
	13	Soil Media Pore Space Available for Retention	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	unitless
	14	Gravel Pore Space Available for Retention	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	unitless
	15	Effective Retention Depth	1.35	1.35	1.35	0.00	0.00	0.00	0.00	0.00	0.00	0.00	inches
	16	Calculated Retention Storage Drawdown (Including 6 Hr Storm)	120	120	120	0	0	0	0	0	0	0	hours
	17	Volume Retained by BMP	709	346	156	0	0	0	0	0	0	0	cubic-feet
	18	Fraction of DCV Retained	0.13	0.09	0.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	ratio
	19	Portion of Retention Performance Standard Satisfied	0.15	0.11	0.12	0.00	0.00	0.00	0.00	0.00	0.00	0.00	ratio
	20	Fraction of DCV Retained (normalized to 36-hr drawdown)	0.07	0.05	0.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00	ratio
	21	Design Capture Volume Remaining for Biofiltration	5,145	3,504	1,539	0	0	0	0	0	0	0	cubic-feet
Biofiltration Calculations	22	Max Hydromod Flow Rate through Underdrain	0.0270	0.0270	0.0143	n/a	n/a	n/a	n/a	n/a	n/a	n/a	CFS
	23	Max Soil Filtration Rate Allowed by Underdrain Orifice	0.18	0.38	0.44	n/a	n/a	n/a	n/a	n/a	n/a	n/a	in/hr
	24	Soil Media Filtration Rate per Specifications	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	in/hr
	25	Soil Media Filtration Rate to be used for Sizing	0.18	0.38	0.44	5.00	5.00	5.00	5.00	5.00	5.00	5.00	in/hr
	26	Depth Biofiltered Over 6 Hour Storm	1.11	2.27	2.67	30.00	30.00	30.00	30.00	30.00	30.00	30.00	inches
	27	Soil Media Pore Space Available for Biofiltration	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	unitless
	28	Effective Depth of Biofiltration Storage	21.00	21.00	21.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	inches
	29	Drawdown Time for Surface Ponding	32	16	14	0	0	0	0	0	0	0	hours
	30	Drawdown Time for Effective Biofiltration Depth	114	55	47	0	0	0	0	0	0	0	hours
	31	Total Depth Biofiltered	22.11	23.27	23.67	30.00	30.00	30.00	30.00	30.00	30.00	30.00	inches
	32	Option 1 - Biofilter 1.50 DCV: Target Volume	7,718	5,256	2,309	0	0	0	0	0	0	0	cubic-feet
	33	Option 1 - Provided Biofiltration Volume	7,718	5,256	2,309	0	0	0	0	0	0	0	cubic-feet
	34	Option 2 - Store 0.75 DCV: Target Volume	3,859	2,628	1,154	0	0	0	0	0	0	0	cubic-feet
	35	Option 2 - Provided Storage Volume	3,859	2,628	1,154	0	0	0	0	0	0	0	cubic-feet
	36	Portion of Biofiltration Performance Standard Satisfied	0.00	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	ratio
Result	37	Do Site Design Elements and BMPs Satisfy Annual Retention Requirements?	Yes	Yes	Yes	-	-	-	-	-	-	-	yes/no
	38	Overall Portion of Performance Standard Satisfied	0.15	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	ratio
	39	This BMP Overflows to the Following Drainage Basin	-	-	-	-	-	-	-	-	-	-	unitless
	40	**Deficit of Effectively Treated Stormwater**	-4,702	0	0	n/a	n/a	n/a	n/a	n/a	n/a	n/a	cubic-feet

Worksheet B.5-1 General Notes:

A. Applicants may use this worksheet to size Lined or Unlined Biofiltration BMPs (BF-1, PR-1) for up to 10 basins. User input must be provided for yellow shaded cells, values for blue cells are automatically populated based on user inputs from previous worksheets, values for all other cells will be automatically generated, errors/notifications will be highlighted in red/orange and summarized below. BMPs fully satisfying the pollutant control performance standards will have a deficit treated volume of zero and be highlighted in green.

Attention!

-Vegetated BMPs must have a surface ponding drawdown time of 24 hours or less. Drawdown times over 24 hours may be permitted at the discretion of County staff if certified by a landscape architect or agronomist.

-This BMP does not fully satisfy the performance standards for pollutant control and must be supplemented with flow-thru treatment and an offsite alternative compliance project.

Summary of Stormwater Pollutant Control Calculations (V1.3)

Category	#	Description	*i*	*ii*	*iii*	*iv*	*v*	*vi*	*vii*	*viii*	*ix*	*x*	Units
General Info	0	Drainage Basin ID or Name	1	2	3	-	-	-	-	-	-	-	unitless
	1	85th Percentile Storm Depth	0.51	0.51	0.51	-	-	-	-	-	-	-	inches
	2	Design Infiltration Rate Recommended by Geotechnical Engineer	0.000	0.000	0.000	-	-	-	-	-	-	-	in/hr
	3	Total Tributary Area	156,816	104,544	56,628	-	-	-	-	-	-	-	sq-ft
	4	85th Percentile Storm Volume (Rainfall Volume)	6,665	4,443	2,407	-	-	-	-	-	-	-	cubic-feet
Initial DCV	5	Initial Weighted Runoff Factor	0.83	0.83	0.68	-	-	-	-	-	-	-	unitless
	6	Initial Design Capture Volume	5,532	3,688	1,637	-	-	-	-	-	-	-	cubic-feet
Site Design Volume Reductions	7	Dispersion Area Reductions	0	0	0	-	-	-	-	-	-	-	cubic-feet
	8	Tree Well and Rain Barrel Reductions	0	0	0	-	-	-	-	-	-	-	cubic-feet
BMP Volume Reductions	9	Effective Area Tributary to BMP	130,157	86,772	38,507	-	-	-	-	-	-	-	square feet
	10	Final Design Capture Volume Tributary to BMP	5,532	3,688	1,637	-	-	-	-	-	-	-	cubic-feet
	11	Basin Drains to the Following BMP Type	Biofiltration	Biofiltration	Biofiltration	-	-	-	-	-	-	-	unitless
	12	Volume Retained by BMP (normalized to 36 hour drawdown)	387	184	98	-	-	-	-	-	-	-	cubic-feet
Total Volume Reductions	13	Total Fraction of Initial DCV Retained within DMA	0.07	0.05	0.06	-	-	-	-	-	-	-	fraction
	14	Percent of Average Annual Runoff Retention Provided	10.7%	7.6%	9.1%	-	-	-	-	-	-	-	%
	15	Percent of Average Annual Runoff Retention Required	4.5%	4.5%	4.5%	-	-	-	-	-	-	-	%
Performance Standard	16	Percent of Pollution Control Standard Satisfied	15.0%	100.0%	100.0%	-	-	-	-	-	-	-	%
Treatment Train	17	Discharges to Secondary Treatment in Drainage Basin	-	-	-	-	-	-	-	-	-	-	unitless
	18	Impervious Surface Area Still Requiring Treatment	122,926	0	0	-	-	-	-	-	-	-	square feet
	19	Impervious Surfaces Directed to Downstream Dispersion Area	-	-	-	-	-	-	-	-	-	-	square feet
	20	Impervious Surfaces Not Directed to Downstream Dispersion Area	-	-	-	-	-	-	-	-	-	-	square feet
Result	21	Deficit of Effectively Treated Stormwater	-4,702	0	0	-	-	-	-	-	-	-	cubic-feet

Summary Notes:

All fields in this summary worksheet are populated based on previous user inputs. If applicable, drainage basin elements that require revisions and/or supplemental information outside the scope of these worksheets are highlighted in orange and summairzed in the red text below. If all drainage basins achieve full compliance without a need for supplemental information, a green message will appear below.

Attention!

-Performance standards for onsite pollutant control are not satisfied. The applicant must implement onsite flow-thru BMPs per Worksheet B.6-1 and an offsite alternative compliance project to mitigate for the deficit of effectively treated stormwater.

Categorization of Infiltration Feasibility Condition	Form I-8

Part 1 - Full Infiltration Feasibility Screening Criteria

Would infiltration of the full design volume be feasible from a physical perspective without any undesirable consequences that cannot be reasonably mitigated?

Note that it is not necessary to investigate each and every criterion in the worksheet if infiltration is precluded. Instead a letter of justification from a geotechnical professional familiar with the local conditions substantiating any geotechnical issues will be required.

Criteria	Screening Question	Yes	No
1	**Is the estimated reliable infiltration rate below proposed facility locations greater than 0.5 inches per hour?** The response to this Screening Question must be based on a comprehensive evaluation of the factors presented in Appendix C.2 and Appendix D.		✓

Provide basis:

The measured infiltration rates of the existing soils based on the on-site infiltration study was calculated; after applying a minimum factor of safety of 2.0 to be LESS than 0.05 inches per hour for all tested locations (P-1 =0.23 inches per hour; P-2 = .06 inches per hour; P-3 = 0.06 inches per hour; P-4 = 0.02 inches per hour and P-5 = 0.14 inches per hour). The results indicate that for the tested locations full infiltration is not feasible. Based on the site geologic conditions it is CW Lamonte's opinion that the infiltration results obtained are typical for the entire site.

Summarize findings of studies; provide reference to studies, calculations, maps, data sources, etc. Provide narrative discussion of study/data source applicability.

2	**Can infiltration greater than 0.5 inches per hour be allowed without increasing risk of geotechnical hazards (slope stability, groundwater mounding, utilities, or other factors) that cannot be mitigated to an acceptable level?** The response to this Screening Question must be based on a comprehensive evaluation of the factors presented in Appendix C.2.		✓

Provide basis:

CWLamonte did not encounter areas with infiltration rates greater than 0.5 inches per hour. Based on the findings, site conditions and on-site testing of the underlying soils, infiltration rate is less than 0.5 inches per hour. As such, infiltration rates greater than 0.5 inches per hour cannot be allowed.

Summarize findings of studies; provide reference to studies, calculations, maps, data sources, etc. Provide narrative discussion of study/data source applicability.

Form I-8 Page 2 of 4			
Criteria	Screening Question	**Yes**	**No**
3	**Can infiltration greater than 0.5 inches per hour be allowed without increasing risk of groundwater contamination (shallow water table, storm water pollutants or other factors) that cannot be mitigated to an acceptable level?** The response to this Screening Question must be based on a comprehensive evaluation of the factors presented in Appendix C.3.	✓	
Provide basis: Full infiltration is not feasible pursuant to responses to criteria 1 and 2 above. Summarize findings of studies; provide reference to studies, calculations, maps, data sources, etc. Provide narrative discussion of study/data source applicability.			
4	**Can infiltration greater than 0.5 inches per hour be allowed without causing potential water balance issues such as change of seasonality of ephemeral streams or increased discharge of contaminated groundwater to surface waters?** The response to this Screening Question must be based on a comprehensive evaluation of the factors presented in Appendix C.3.	✓	
Provide basis: Full infiltration is not feasible pursuant to responses to criteria 1 and 2 above. Summarize findings of studies; provide reference to studies, calculations, maps, data sources, etc. Provide narrative discussion of study/data source applicability.			
Part 1 Result *	If all answers to rows 1 - 4 are "**Yes**" a full infiltration design is potentially feasible. The feasibility screening category is **Full Infiltration** If any answer from row 1-4 is "**No**", infiltration may be possible to some extent but would not generally be feasible or desirable to achieve a "full infiltration" design. Proceed to Part 2		

*To be completed using gathered site information and best professional judgment considering the definition of MEP in the MS4 Permit. Additional testing and/or studies may be required by Agency/Jurisdictions to substantiate findings

Form I-8 Page 3 of 4

Part 2 – Partial Infiltration vs. No Infiltration Feasibility Screening Criteria

Would infiltration of water in any appreciable amount be physically feasible without any negative consequences that cannot be reasonably mitigated?

Criteria	Screening Question	Yes	No
5	**Do soil and geologic conditions allow for infiltration in any appreciable rate or volume?** The response to this Screening Question must be based on a comprehensive evaluation of the factors presented in Appendix C.2 and Appendix D.		✓

Provide basis:

The measured infiltration rats of the existing soils based on the on-site infiltration study was calculated after applying a minimum factor of safety of 2.0 to range from 0.02 to 0.23 for locations P-1 through P-5, indicating that at these locations partial infiltration is not feasible.

Summarize findings of studies; provide reference to studies, calculations, maps, data sources, etc. Provide narrative discussion of study/data source applicability and why it was not feasible to mitigate low infiltration rates.

6	**Can Infiltration in any appreciable quantity be allowed without increasing risk of geotechnical hazards (slope stability, groundwater mounding, utilities, or other factors) that cannot be mitigated to an acceptable level**? The response to this Screening Question must be based on a comprehensive evaluation of the factors presented in Appendix C.2.		✓

Provide basis:

Although increased risks to geotechnical hazards (slope stability, groundwater mounding, utilities, or other factors) are not factors at the site CWLamonte did not encounter areas with infiltration rates that are feasible or partial infiltration.

Summarize findings of studies; provide reference to studies, calculations, maps, data sources, etc. Provide narrative discussion of study/data source applicability and why it was not feasible to mitigate low infiltration rates.

Form I-8 Page 4 of 4			
Criteria	Screening Question	**Yes**	**No**
7	**Can Infiltration in any appreciable quantity be allowed without posing significant risk for groundwater related concerns (shallow water table, storm water pollutants or other factors)?** The response to this Screening Question must be based on a comprehensive evaluation of the factors presented in Appendix C.3.	✓	
Provide basis: Partial infiltration is not feasible pursuant to responses to criteria 5 and 6 above. Summarize findings of studies; provide reference to studies, calculations, maps, data sources, etc. Provide narrative discussion of study/data source applicability and why it was not feasible to mitigate low infiltration rates.			
8	**Can infiltration be allowed without violating downstream water rights**? The response to this Screening Question must be based on a comprehensive evaluation of the factors presented in Appendix C.3.	✓	
Provide basis: Partial infiltration is not feasible pursuant to responses to criteria 5 and 6 above. Summarize findings of studies; provide reference to studies, calculations, maps, data sources, etc. Provide narrative discussion of study/data source applicability and why it was not feasible to mitigate low infiltration rates.			
Part 2 Result*	If all answers from row 1-4 are yes then partial infiltration design is potentially feasible. The feasibility screening category is **Partial Infiltration.** If any answer from row 5-8 is no, then infiltration of any volume is considered to be **infeasible** within the drainage area. The feasibility screening category is **No Infiltration.**	No Infiltration	

*To be completed using gathered site information and best professional judgment considering the definition of MEP in the MS4 Permit. Additional testing and/or studies may be required by Agency/Jurisdictions to substantiate findings

SOURCE CONTROL BMP NOTES

4.2.1: PREVENT ILLICIT DISCHARGES INTO THE MS4
4.2.2: STORM DRAIN SYSTEM STENCILING OR SIGNAGE
4.2.3: PROTECT OUTDOOR MATERIAL STORAGE AREAS FROM RUN-ON, RAINFALL, AND WIND DISPERSAL
4.2.5: PROTECT TRASH STORAGE AREAS FROM RAINFALL, RUN-ON, RUNOFF, AND WIND DISPERSAL

SITE DESIGN BMP NOTES

4.3.1: MAINTAIN NATURAL DRAINAGE PATHWAYS AND HYDROLOGIC FEATURES
4.3.2: CONSERVE NATURAL AREAS, SOILS, AND VEGETATION
4.3.3: MINIMIZE IMPERVIOUS AREA
4.3.4: MINIMIZE SOIL COMPACTION
4.3.7: LANDSCAPING WITH NATIVE OR DROUGHT TOLERANT SPECIES

NOTES

1. UNDERLYING HYDROLOGIC SOIL GROUP: TYPE "C"
2. PURSUANT TO THE PROJECT'S GEOTECHNICAL REPORT, GROUNDWATER IS EXPECTED TO BE DEEPER THAN 50 FEET BELOW EXISITNG GROUND. GROUNDWATER WAS NOT ENCOUNTERED DURING THE SOILS INVESTIGATION.
3. POTENTIAL CRITICAL COURSE SEDIMENT YIELD AREAS (PCCSYA)LOCATED OFF-SITE AND NO NEGATIVE IMPACTS ARE EXPECTED TO OCCUR AS A RESULT OF THIS DEVELOPMENT, PLEASE SEE ATTACHMENT 3C FOR MORE DETAILS.
4. DMA-4 AND DMA-5 COMPLY WITH SECTION 5.2.1 OF THE COUNTY BMP DESIGN MANUAL IN THAT THEY HAVE LESS THAN 5% IMPERVIOUSNESS, ARE HYDRAULICALLY SEPERATE FROM OTHER DMA'S, AND CONTAIN LANDSCAPED AREAS THAT DO NOT REQUIRE REGULAR APPLICATION OF PESTICIDES/FERTILIZER. THEREFORE THESE AREAS ARE SELF-MITIGATING.
5. IT SHOULD BE NOTED THAT APPROXIMATELY 1,020 S.F. OF REQUIRED IMPERVIOUS AREA ON JEFFERSON RD CANNOT BE FEASIBLY TREATED DUE TO SITE CONSTRAINTS. HOWEVER, APPROXIMATELY 11,000 S.F. OF "EXCESS TREATED" IMPERVIOUS AREA IS MANAGED WITIHIN THE PROJECT'S BMPS, WHICH MORE THAN OFFSETS THE REQUIRED UNTREATED AREA. THE "EXCESS TREATED" IMPERVIOUS AREA IS COMPRISED OF EXISTING ROADWAY THAT WILL BE OVERLAID AND IS THEREFORE NOT REQUIRED TO BE TREATED AS PART OF THE PROJECT.

LEGEND

- DRAINAGE MANAGEMENT AREA (DMA) BOUNDARY
- XX.X AC. — TRIBUTARY AREA TO DRAINAGE MANAGEMENT AREA
- BMP-X — STRUCTURAL BMP
- IMPERVIOUS AREA
- DECOMPOSED GRANITE SURFACE
- 4.X.X — SOURCE CONTROL & SITE DESIGN BMP LOCATION
- BIOFILTRATION BASIN
- DMA-X — DRAINAGE MANAGEMENT AREA ID
- EXCESS TREATED IMPERVIOUS AREA
- UNTREATED IMPERVIOUS AREA

DRAINAGE MANAGEMENT AREA (DMA)			STRUCTURAL BMP (S-BMP)		
DMA ID	DMA AREA	DMA TYPE	S-BMP ID	S-BMP TYPE	S-BMP BOT. FOOTPRINT
DMA 1 & 1B	3.6 AC.	DRAINS TO BMP	BMP-1	BIOFILTRATION	6,300SF
DMA 2 & 2B	2.4 AC.	DRAINS TO BMP	BMP-2		3,077 SF
DMA 3 & 3B	1.3 AC.	DRAINS TO BMP	BMP-3		1,388 SF
DMA 4	2.1 AC.	SELF-MITIGATING	N/A		
DMA 5	0.4 AC.	SELF-MITIGATING	N/A		

DRAINAGE MANAGEMENT AREA EXHIBIT FOR JAMUL RETAIL CENTER

J-18145

Date: March 26, 2018
Date: July 10, 2018
Date: October 8, 2018

RICK ENGINEERING COMPANY
San Diego
5620 FRIARS ROAD
SAN DIEGO, CA 92110
619-291-0707
(FAX) 619-291-4165
rickengineering.com
Riverside - Orange - Sacramento - San Luis Obispo - Phoenix - Tucson - Denver

NOT FOR CONSTRUCTION - EXHIBIT FOR PRELIMINARY PDP SWQMP

ATTACHMENT 2

BACKUP FOR PDP HYDROMODIFICATION CONTROL MEASURES

This is the cover sheet for Attachment 2.

☐ Mark this box if this attachment is empty because the project is exempt from PDP hydromodification management requirements.

Indicate which Items are Included behind this cover sheet:

Attachment Sequence	Contents	Checklist
Attachment 2a	Flow Control Facility Design, including Structural BMP Drawdown Calculations and Overflow Design Summary (Required) See Chapter 6 and Appendix G of the BMP Design Manual	☒ Included ☐ Submitted as separate stand-alone document
Attachment 2b	Hydromodification Management Exhibit (Required)	☒ Included See Hydromodification Management Exhibit Checklist on the back of this Attachment cover sheet.
Attachment 2c	Management of Critical Coarse Sediment Yield Areas See Section 6.2 and Appendix H of the BMP Design Manual.	☒ Exhibit depicting onsite and/or upstream sources of critical coarse sediment as mapped by Regional or Jurisdictional approaches outlined in Appendix H.1 AND, ☐ Demonstration that the project effectively avoids and bypasses sources of mapped critical coarse sediment per approaches outlined in Appendix H.2 and H.3. OR, ☐ Demonstration that project does not generate a net impact on the receiving water per approaches outlined in Appendix H.4.
Attachment 2d	Geomorphic Assessment of Receiving Channels (Optional) See Section 6.3.4 of the BMP Design Manual.	☒ Not performed ☐ Included ☐ Submitted as separate stand-alone document
Attachment 2e	Vector Control Plan (Required when structural BMPs will not drain in 96 hours)	☐ Included ☒ Not required because BMPs will drain in less than 96 hours

Use this checklist to ensure the required information has been included on the Hydromodification Management Exhibit:

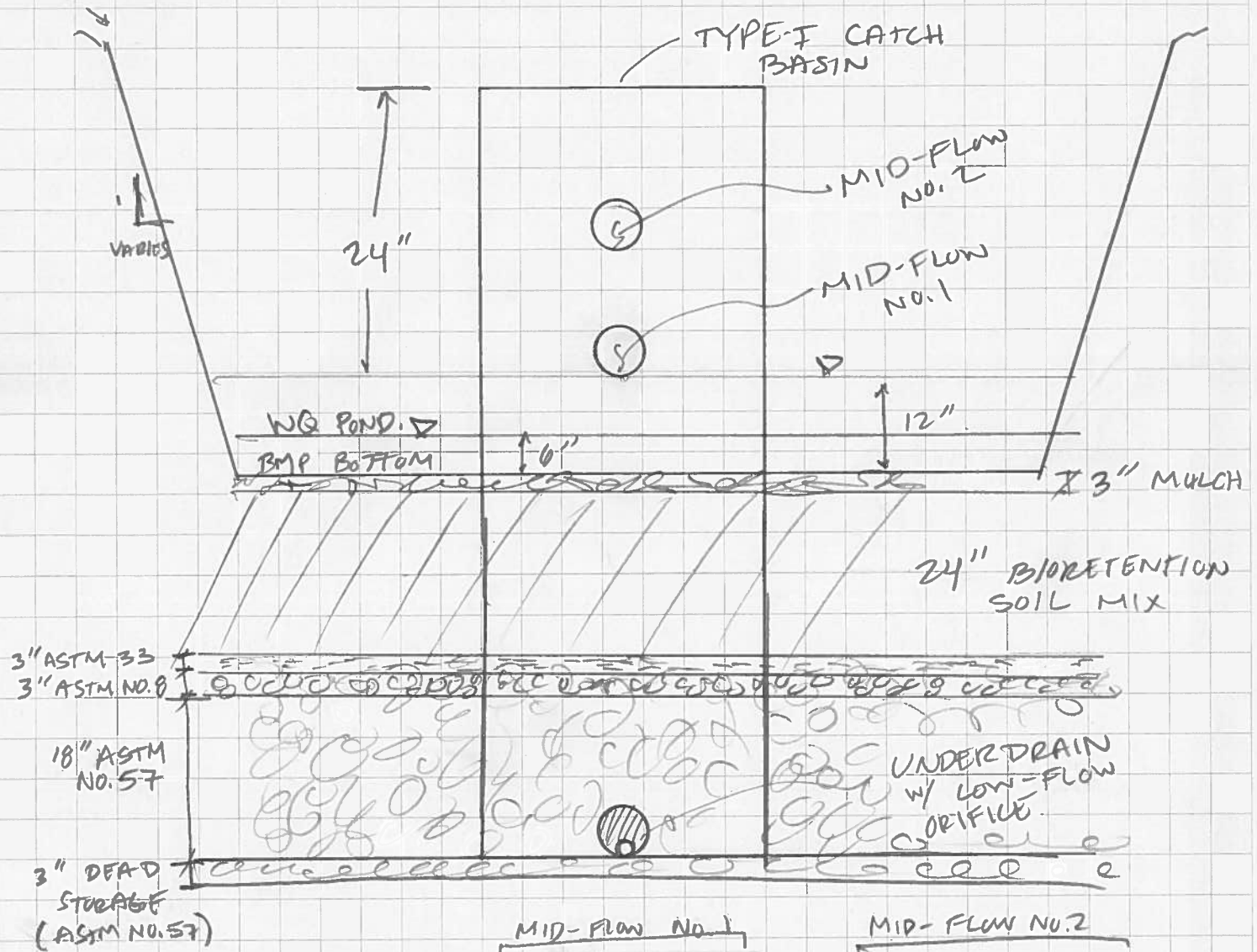
The Hydromodification Management Exhibit must identify:

☒ Underlying hydrologic soil group
☒ Approximate depth to groundwater
☒ Existing natural hydrologic features (watercourses, seeps, springs, wetlands)
☒ Critical coarse sediment yield areas to be protected
☒ Existing topography
☒ Existing and proposed site drainage network and connections to drainage offsite
☒ Proposed grading
☒ Proposed impervious features
☒ Proposed design features and surface treatments used to minimize imperviousness
☒ Point(s) of Compliance (POC) for Hydromodification Management
☒ Existing and proposed drainage boundary and drainage area to each POC (when necessary, create separate exhibits for pre-development and post-project conditions)
☒ Structural BMPs for hydromodification management (identify location, type of BMP, and size/detail)

RICK ENGINEERING COMPANY™
5620 Friars Road
San Diego, CA 92110-2596
Tel: (619) 291-0707
Fax: (619) 291-4165

Date 3/26/18
Job No. 18145
Page
Done By HC
Checked By

JAMUL RETAIL CENTER - BMP x-SECT.



BMP I.D	LOW FLOW DIAM (in)	MID-FLOW NO. 1 ELEV (ft)	MID-FLOW NO. 1 DIAM (in)	MID-FLOW NO. 2 ELEV (ft)	MID-FLOW NO. 2 DIAM (in)
BMP 1	0.6875	1.0'	0.6875_{x1}	2.5'	0.75_{x4}
BMP 2	0.6875	1.0'	1.0_{x1}	N/A	N/A
BMP 3	0.5	1.0'	0.5625_{x1}	2.0'	0.5_{x1}

NOTE: ELEVATIONS ARE RELATIVE TO BMP BOTTOM.

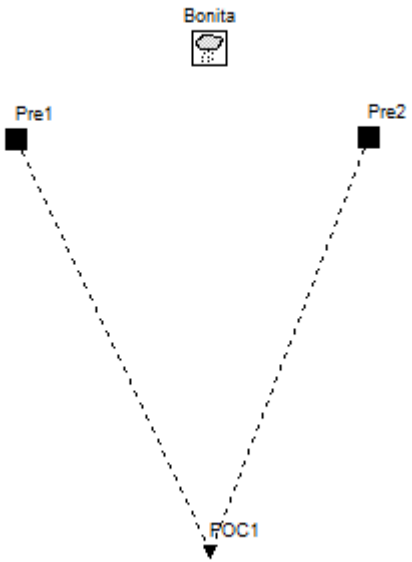
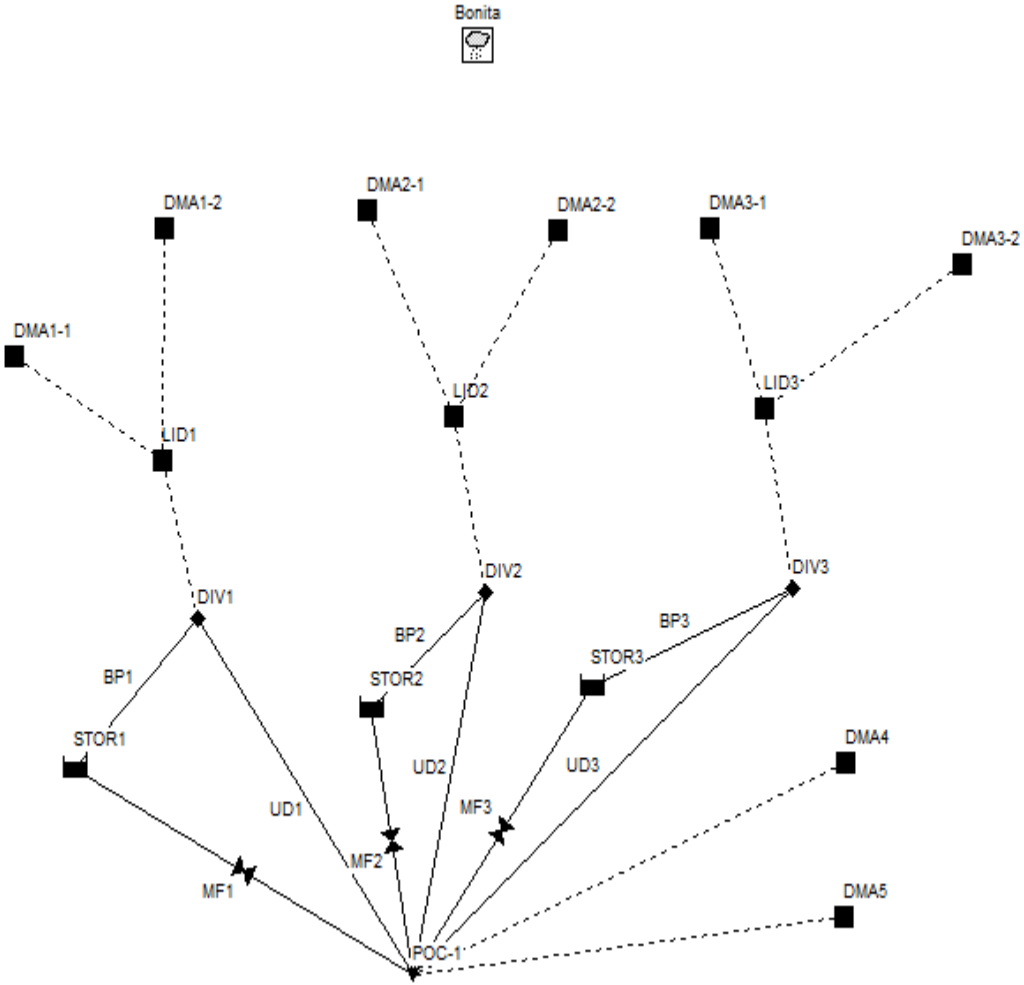
SWMM Model Inputs

- POC-1
    - -Schematic
    - -Pre-development Input
    - -Post-project Input
    - -LID Control Calculations
    - -Rating Curve

- NRCS Web Soil Survey Hydrologic Soil Group Report
- Rain Gage Exhibit

Jamul Retail Center
J-18145
7/10/18

SWMM Model Schematics – POC 1

Pre-development Model	Post-project Model
	

```
[TITLE]
;;Project Title/Notes
JAMUL RETAIL CENTER
POC-1 PRE-DEVELOPMENT CONDITION
J-18145

[OPTIONS]
;;Option                Value
FLOW_UNITS              CFS
INFILTRATION            GREEN_AMPT
FLOW_ROUTING            KINWAVE
LINK_OFFSETS            DEPTH
MIN_SLOPE               0
ALLOW_PONDING           NO
SKIP_STEADY_STATE       NO

START_DATE              10/03/1970
START_TIME              05:00:00
REPORT_START_DATE       10/03/1970
REPORT_START_TIME       05:00:00
END_DATE                05/25/2008
END_TIME                22:00:00
SWEEP_START             01/01
SWEEP_END               12/31
DRY_DAYS                0
REPORT_STEP             01:00:00
WET_STEP                00:15:00
DRY_STEP                04:00:00
ROUTING_STEP            0:01:00

INERTIAL_DAMPING        PARTIAL
NORMAL_FLOW_LIMITED     BOTH
FORCE_MAIN_EQUATION     H-W
VARIABLE_STEP           0.75
LENGTHENING_STEP        0
MIN_SURFAREA            12.557
MAX_TRIALS              8
HEAD_TOLERANCE          0.005
SYS_FLOW_TOL            5
LAT_FLOW_TOL            5
MINIMUM_STEP            0.5
THREADS                 1

[EVAPORATION]
;;Data Source           Parameters
;;--------------        ----------------
MONTHLY                 .07     .1      .13     .17     .19     .22     .24     .22     .19     .13     .09
        .06
DRY_ONLY                NO

[RAINGAGES]
;;Name                  Format          Interval        SCF             Source
;;--------------        ---------       ------  ------  ----------
Bonita                  VOLUME          1:00            1.0             TIMESERIES      TS-Bonita

[SUBCATCHMENTS]
;;Name                  Rain Gage               Outlet                  Area            %Imperv
Width           %Slope          CurbLen         SnowPack
;;--------------        ----------------        ----------------        --------        --------
--------        --------        --------        ----------------
Pre1                    Bonita                  POC1                    7.6             0               632
        9.54            0
Pre2                    Bonita                  POC1                    2.3             0               290
        5.1             0

[SUBAREAS]
;;Subcatchment          N-Imperv        N-Perv          S-Imperv        S-Perv          PctZero
RouteTo         PctRouted
;;--------------        ----------      ----------      ----------      ----------      ----------
----------      ----------
Pre1                    0.012           .1              0.05            0.1             25
OUTLET
Pre2                    0.012           0.1             0.05            0.1             25
OUTLET

[INFILTRATION]
;;Subcatchment          Suction         Ksat            IMD
;;--------------        ----------      ----------      ----------
Pre1                    6               .1              .32
Pre2                    6               .1              .32
```

```
[OUTFALLS]
;;Name                Elevation       Type            Stage Data              Gated           Route To
;;--------------      ----------      ----------      ----------------        --------
----------------
POC1                 0               FREE                                    NO


[TIMESERIES]
;;Name                Date            Time            Value
;;--------------      ----------      ----------      ----------
TS-Bonita            FILE    "bonita.dat"

[REPORT]
;;Reporting Options
INPUT           NO
CONTROLS        NO
SUBCATCHMENTS   ALL
NODES   ALL
LINKS   ALL

[TAGS]

[MAP]
DIMENSIONS      0.000   0.000   10000.000       10000.000
Units           None

[COORDINATES]
;;Node                X-Coord             Y-Coord
;;--------------      ------------------  ------------------
POC1                 4190.523            3613.031

[VERTICES]
;;Link                X-Coord             Y-Coord
;;--------------      ------------------  ------------------

[Polygons]
;;Subcatchment        X-Coord             Y-Coord
;;--------------      ------------------  ------------------
Pre1                 3232.971            5646.594
Pre2                 4970.385            5656.466

[SYMBOLS]
;;Gage                X-Coord             Y-Coord
;;--------------      ------------------  ------------------
Bonita               4200.395            6080.948
```

```
[TITLE]
;;Project Title/Notes
JAMUL RETAIL CENTER
POC-1 POST-DEVELOPMENT CONDITION
J-18145

[OPTIONS]
;;Option                Value
FLOW_UNITS              CFS
INFILTRATION            GREEN_AMPT
FLOW_ROUTING            KINWAVE
LINK_OFFSETS            DEPTH
MIN_SLOPE               0
ALLOW_PONDING           NO
SKIP_STEADY_STATE       NO

START_DATE              10/03/1970
START_TIME              05:00:00
REPORT_START_DATE       10/03/1970
REPORT_START_TIME       05:00:00
END_DATE                05/25/2008
END_TIME                22:00:00
SWEEP_START             01/01
SWEEP_END               12/31
DRY_DAYS                0
REPORT_STEP             01:00:00
WET_STEP                00:15:00
DRY_STEP                04:00:00
ROUTING_STEP            0:01:00

INERTIAL_DAMPING        PARTIAL
NORMAL_FLOW_LIMITED     BOTH
FORCE_MAIN_EQUATION     H-W
VARIABLE_STEP           0.75
LENGTHENING_STEP        0
MIN_SURFAREA            12.557
MAX_TRIALS              8
HEAD_TOLERANCE          0.005
SYS_FLOW_TOL            5
LAT_FLOW_TOL            5
MINIMUM_STEP            0.5
THREADS                 1

[EVAPORATION]
;;Data Source          Parameters
;;--------------       ----------
MONTHLY                 .07     .1      .13     .17     .19     .22     .24     .22     .19     .13     .09
        .06
DRY_ONLY                NO

[RAINGAGES]
;;Name                 Format          Interval        SCF             Source
;;--------------       ---------       ------  ------  ----------
Bonita                  VOLUME          1:00            1.0             TIMESERIES      TS-Bonita

[SUBCATCHMENTS]
;;Name                 Rain Gage               Outlet                  Area            %Imperv
Width           %Slope          CurbLen         SnowPack
;;--------------       ----------------        ----------------        --------        --------
--------        --------        --------        ----------------
DMA4                    Bonita                  POC-1                   2.1             0               330
        45              0
DMA5                    Bonita                  poc-1                   0.4             0               48
        .5              0
DMA1-1                  Bonita                  LID1                    3.3             92              140
        1.0             0
DMA1-2                  Bonita                  LID1                    .3              85              41
        5.4             0
DMA2-1                  Bonita                  LID2                    2.1             90              230
        1               0
DMA2-2                  Bonita                  LID2                    0.2             85              40
        3.2             0
DMA3-1                  Bonita                  LID3                    1.1             60              130
        1               0
DMA3-2                  Bonita                  LID3                    .2              85              40
        2.7             0
LID1                    Bonita                  DIV1                    .144628         0               25
        .001            0
LID2                    Bonita                  DIV2                    .07064          0               27
        0.001           0
LID3                    Bonita                  DIV3                    0.03156         0
```

```
27.5            0.001           0

[SUBAREAS]
;;Subcatchment          N-Imperv        N-Perv          S-Imperv        S-Perv          PctZero
RouteTo         PctRouted
;;--------------        ----------      ----------      ----------      ----------      ----------
----------      ----------
DMA4                    0.012           .12             0.05            0.1             25
OUTLET
DMA5                    0.012           0.12            0.05            0.1             25
OUTLET
DMA1-1                  0.012           0.12            0.05            0.1             25
OUTLET
DMA1-2                  0.012           0.12            0.05            0.1             25
OUTLET
DMA2-1                  0.012           0.12            0.05            0.1             25
OUTLET
DMA2-2                  0.012           0.12            0.05            0.1             25
OUTLET
DMA3-1                  0.012           0.12            0.05            0.1             25
OUTLET
DMA3-2                  0.012           0.12            0.05            0.1             25
OUTLET
LID1                    0.012           0.12            0.05            0.1             25
OUTLET
LID2                    0.012           0.12            0.05            0.1             25
OUTLET
LID3                    0.012           0.12            0.05            0.1             25
OUTLET

[INFILTRATION]
;;Subcatchment          Suction         Ksat            IMD
;;--------------        ----------      ----------      ----------
DMA4                    6               .075            .32
DMA5                    6               .075            .32
DMA1-1                  6               .075            .32
DMA1-2                  6               .075            .32
DMA2-1                  6               .075            .32
DMA2-2                  6               .075            .32
DMA3-1                  6               .075            .32
DMA3-2                  6               .075            .32
LID1                    1.5             5               .32
LID2                    1.5             5               .32
LID3                    1.5             5               .32

[LID_CONTROLS]
;;Name                  Type/Layer      Parameters
;;--------------        ----------      ----------
LID1                    BC
LID1                    SURFACE         13.2            0.0             0               0               5

LID1                    SOIL            27              0.4             0.2             0.1             5
        5               1.5
LID1                    STORAGE         24              .67             0               0
LID1                    DRAIN           .024            0.5             0               6

LID2                    BC
LID2                    SURFACE         12              0.0             0               0               5

LID2                    SOIL            27              0.4             0.2             0.1             5
        5               1.5
LID2                    STORAGE         24              0.67            0               0
LID2                    DRAIN           .0507           0.5             0               6

LID3                    BC
LID3                    SURFACE         14.1            0.0             0               0               5

LID3                    SOIL            27              0.4             0.2             0.1             5
        5               1.5
LID3                    STORAGE         24              0.67            0               0
LID3                    DRAIN           .059            0.5             0               6

[LID_USAGE]
;;Subcatchment          LID Process             Number  Area            Width           InitSat
FromImp         ToPerv          RptFile                         DrainTo
;;--------------        ----------      ----------------        -------         ----------      ----------      ----------
----------      ----------      ------------------------        ----------------
LID1                    LID1                    1       6300.00         25              0               100
        0
LID2                    LID2                    1       3077.08         27              0               100
        0
```

```
LID3                    LID3                    1       1374.75         27.5            0               100
        0

[OUTFALLS]
;;Name                 Elevation       Type            Stage Data              Gated           Route To
;;---------------      ----------      ----------      ----------------        --------
----------------
POC-1                   0               FREE                                    NO


[DIVIDERS]
;;Name                 Elevation       Diverted Link           Type            Parameters
;;---------------      ----------      ----------------        ----------      ----------
DIV1                    0               BP1                     CUTOFF          .0284           3
0               0               0
DIV2                    0               BP2                     CUTOFF          .0284           3
0               0               0
DIV3                    0               BP3                     CUTOFF          .015            3
0               0               0

[STORAGE]
;;Name                 Elev.           MaxDepth        InitDepth       Shape           Curve Name/Params
                N/A             Fevap           Psi             Ksat            IMD
;;---------------      --------        ----------      ----------      ----------
----------------------------    --------        --------                        --------        --------
STOR3                   0               3               0               TABULAR         STOR3
                0               1
STOR2                   0               3               0               TABULAR         STOR2
                0               1
STOR1                   0               3               0               TABULAR         STOR1
                0               1

[CONDUITS]
;;Name                 From Node               To Node                 Length          Roughness
InOffset        OutOffset       InitFlow        MaxFlow
;;---------------      ----------------        ----------------        ----------      ----------
----------      ----------      ----------      ----------
UD1                     DIV1                    POC-1                   1               0.01            0
        0               0               0
BP1                     DIV1                    STOR1                   1               0.01            0
        0               0               0
BP2                     DIV2                    STOR2                   1               0.01            0
        0               0               0
BP3                     DIV3                    STOR3                   1               0.01            0
        0               0               0
UD2                     DIV2                    POC-1                   1               0.01            0
        0               0               0
UD3                     DIV3                    POC-1                   1               0.01            0
        0               0               0

[OUTLETS]
;;Name                 From Node               To Node                 Offset          Type
QTable/Qcoeff           Qexpon          Gated
;;---------------      ----------------        ----------------        ----------      ---------------
----------------        ----------      --------
MF1                     STOR1                   POC-1                   0               TABULAR/DEPTH
RatingCurve1                            NO
MF2                     STOR2                   POC-1                   0               TABULAR/DEPTH
RatingCurve2                            NO
MF3                     STOR3                   POC-1                   0               TABULAR/DEPTH
RatingCurve3                            NO

[XSECTIONS]
;;Link                 Shape           Geom1                   Geom2           Geom3           Geom4
Barrels         Culvert
;;---------------      ------------    ----------------        ----------      ----------      ----------
----------      ----------
UD1                     DUMMY           0                       0               0               0
1
BP1                     DUMMY           0                       0               0               0
1
BP2                     DUMMY           0                       0               0               0
1
BP3                     DUMMY           0                       0               0               0
1
UD2                     DUMMY           0                       0               0               0
1
UD3                     DUMMY           0                       0               0               0
1
```

```
[CURVES]
;;Name                Type           X-Value         Y-Value
;;--------------      ----------     ----------      ----------
;HEAD TOTAL Q
RatingCurve1           Rating         0.00            0.000
RatingCurve1                          0.50            0.009
RatingCurve1                          0.75            0.011
RatingCurve1                          1.00            0.012
RatingCurve1                          1.50            0.015
RatingCurve1                          2.00            0.058
RatingCurve1                          2.10            0.942
RatingCurve1                          2.50            9.878
RatingCurve1                          3.00            23.493
;
RatingCurve2           Rating         0.00            0.000
RatingCurve2                          0.50            0.018
RatingCurve2                          0.75            0.022
RatingCurve2                          1.00            0.026
RatingCurve2                          1.50            0.032
RatingCurve2                          2.00            0.037
RatingCurve2                          2.10            0.918
RatingCurve2                          2.50            9.841
RatingCurve2                          3.00            23.445
;
RatingCurve3           Rating         0.00            0.000
RatingCurve3                          0.50            0.006
RatingCurve3                          0.75            0.007
RatingCurve3                          1.00            0.008
RatingCurve3                          1.50            0.015
RatingCurve3                          2.00            0.898
RatingCurve3                          2.1             9.819
RatingCurve3                          3.0             23.424
;
STOR1                  Storage        0.00            7790
STOR1                                 0.50            8516
STOR1                                 0.75            8884
STOR1                                 1.00            9256
STOR1                                 1.50            10010
STOR1                                 2.00            10778
STOR1                                 2.10            10934
STOR1                                 2.50            11561
STOR1                                 3.00            12358
;
STOR2                  Storage        0.00            3077
STOR2                                 0.50            3436
STOR2                                 0.75            3620
STOR2                                 1.00            3808
STOR2                                 1.50            4192
STOR2                                 2.00            4588
STOR2                                 2.50            4997
STOR2                                 3.00            5418
;
STOR3                  Storage        0               1890
STOR3                                 .5              2028
STOR3                                 .75             2170
STOR3                                 1               2316
STOR3                                 1.5             2622
STOR3                                 2               2950
STOR3                                 3               3648

[TIMESERIES]
;;Name                Date           Time            Value
;;--------------      ----------     ----------      ----------
TS-Bonita              FILE    "bonita.dat"

[REPORT]
;;Reporting Options
INPUT           NO
CONTROLS        NO
SUBCATCHMENTS   ALL
NODES   ALL
LINKS   ALL

[TAGS]

[MAP]
DIMENSIONS      0.000   0.000   10000.000       10000.000
Units           None

[COORDINATES]
;;Node                X-Coord                Y-Coord
```

```
;;--------------       ------------------     ------------------
POC-1                   3746.298               1915.104
DIV1                    2537.917               3670.374
DIV2                    4138.595               3917.228
DIV3                    5851.781               3715.111
STOR3                   4709.130               3464.337
STOR2                   3137.632               3849.856
STOR1                   1850.938               2931.885

[VERTICES]
;;Link                 X-Coord                Y-Coord
;;--------------       ------------------     ------------------

[Polygons]
;;Subcatchment         X-Coord                Y-Coord
;;--------------       ------------------     ------------------
DMA4                    7035.611               2762.271
DMA5                    6717.998               3522.618
DMA1-1                  1516.684               4964.611
DMA1-2                  2355.915               5601.618
DMA2-1                  3489.635               5686.081
DMA2-2                  4560.162               5591.507
DMA3-1                  5409.505               5601.618
DMA3-2                  6814.965               5419.616
LID1                    2406.160               4735.322
LID2                    3984.601               4966.314
LID3                    5967.276               5024.062

[SYMBOLS]
;;Gage                 X-Coord                Y-Coord
;;--------------       ------------------     ------------------
Bonita                  4121.422               6485.686
```

SWMM - LID Control Calculations

PARAMETER	ABBREV.	BMP 1 ("Bio-Retention Cell")		BMP 2 ("Bio-Retention Cell")		BMP 3 ("Bio-Retention Cell")	
WQ Ponding Depth	PD	12	in	12	in	12	in
Bioretention Soil Layer	S	27	in	27	in	27	in
Gravel Layer	G	24	in	24	in	24	in
TOTAL		5.3	ft	5.3	ft	5.3	ft
		63	in	63	in	63	in
Orifice Coefficient	c_g	0.6	--	0.6	--	0.6	--
Low Flow Orifice Diameter	D	0.6875	in	0.6875	in	0.5	in
Drain exponent	n	0.5	--	0.5	--	0.5	--
Surface Area @ WQ Ponding Depth	A_{PD}	7,800	ft^2	3,077	ft^2	1,890	ft^2
Surface Area @ Basin Bottom	A_{bot}	6,500	ft^2	3,077	ft^2	1,400	ft^2
Modelled LID Surface Area @...	A_{LID}	6,500	ft^2	3,077	ft^2	1,400	ft^2
Surface Area @ Basin Bottom		0.14922	ac	0.07064	ac	0.03214	ac
Effective Ponding Depth	PD_{eff}	**13.20**	in	**12.00**	in	**14.10**	in
Flow Coefficient	C	**0.0240**	--	**0.0507**	--	**0.0590**	--
Bioretention Soil Media Design Percolation Rate		5	in/hr	5	in/hr	5	in/hr
Max. Flow Rate thru BSM	$Q_{BSM,max.}$	0.75231	cfs	0.35613	cfs	0.16204	cfs
Max. Flow Rate thru Low Flow Orifice	$Q_{LF,max.}$	0.02836	cfs	0.02836	cfs	0.01501	cfs
		Q thru low flow orifice governs		*Q thru low flow orifice governs*		*Q thru low flow orifice governs*	
Storage Unit: Cutoff Flow	Q_{cutoff}	**0.0284**	cfs	**0.0284**	cfs	**0.0150**	cfs

BMP-1 FULL RATING CURVE

Orifice Equation Calculation

$Q_{orifice} = C_o * A * (2 * g * (H-h))^{0.5}$

Orifice Coefficient, C_o	0.6
g (ft/s2)	32.2
Increment (ft)	0.10

CIRCULAR OPENINGS	1 x 0.6875" dia.	4 x 0.75" dia.	Type I x " dia.
# of openings	1	4	Type I
Orifice Size (inches)	0.6875	0.75	

Flowline of Orifice (ft)	0	1.5	2

Flowline[1] (ft)	Q (cfs)	$Q_{midflow}$ (cfs)	$Q_{Type\ I}$(cfs)	TOTAL
0.00	No Value	-		**0.000**
0.50	0.009	-		**0.009**
0.75	0.011	-		**0.011**
1.00	0.012	-		**0.012**
1.50	0.015	No Value		**0.015**
2.00	0.017	0.040	0	**0.058**
2.10	0.018	0.045	0.880	**0.942**
2.50	0.020	0.058	9.800	**9.878**
3.00	0.021	0.072	23.400	**23.493**

Flowline aboveWQ Ponding (ft)	Horizontal from 3:1 Side Slopes	Area (sq ft)	Surface Volume (cu-ft)	Surface Volume (ac-ft)
	-	-	-	-
	-	-	-	-
0.00	0.00	7790	0	0.0000
0.50	1.50	8516	4077	0.0936
0.75	2.25	8884	6252	0.1435
1.00	3.00	9256	8519	0.1956
1.50	4.50	10010	13336	0.3061
2.00	6.00	10778	18533	0.4254
2.10	6.30	10934	19618	0.4504
2.50	7.50	11561	24117	0.5537
3.00	9.00	12358	30097	0.6909

BMP-2 FULL RATING CURVE

Orifice Equation Calculation

$Q_{orifice} = C_o * A * (2 * g * (H-h))^{0.5}$

Orifice Coefficient, C_o	0.6
g (ft/s2)	32.2
Increment (ft)	0.10

CIRCULAR OPENINGS	1 x 1" dia.	None	None
# of openings	1	0	0
Orifice Size (inches)	1	0	0

Flowline of Orifice (ft)	0	0	Type I

Flowline[1] (ft)	Q (cfs)	$Q_{midflow}$ (cfs)	$Q_{Type\ I}$ (cfs)	TOTAL
0.00	No Value	0.000		**0.000**
0.50	0.018	0.000		**0.018**
0.75	0.022	0.000		**0.022**
1.00	0.026	0.000		**0.026**
1.50	0.032	0.000		**0.032**
2.00	0.037	0.000	0.000	**0.037**
2.10	0.038	0.000	0.880	**0.918**
2.50	0.041	0.000	9.8	**9.841**
3.00	0.045	0.000	23.400	**23.445**

Flowline above WQ Ponding (ft)	Horizontal from 3:1 Side Slopes	Area (sq ft)	Surface Volume (cu-ft)	Surface Volume (ac-ft)
	-	-	-	-
	-	-	-	-
0.00	0.00	3077	0	0.0000
0.50	1.50	3436	1628	0.0374
0.75	2.25	3620	2510	0.0576
1.00	3.00	3808	3439	0.0789
1.50	4.50	4192	5439	0.1249
2.00	6.00	4588	7634	0.1752
2.50	7.50	4997	10030	0.2303
3.00	9.00	5418	12634	0.2900

BMP-3 FULL RATING CURVE

Orifice Equation Calculation

$Q_{orifice} = C_o * A * (2 * g * (H-h))^{0.5}$

Orifice Coefficient, C_o	0.6
g (ft/s2)	32.2
Increment (ft)	1.00

CIRCULAR OPENINGS	1 x 0.5625" dia.	1 x 0.5" dia.	None
# of openings	1	1	0
Orifice Size (inches)	0.5625	0.5	0

Flowline of Orifice (ft)	0	1	0

Flowline[1] (ft)	Q (cfs)	$Q_{midflow}$ (cfs)	$Q_{Type\ I}$(cfs)	TOTAL
0.00	No Value	-	0.000	**0.000**
0.50	0.006	-	0.000	**0.006**
0.75	0.007	-	0.000	**0.007**
1.00	0.008	No Value	0.000	**0.008**
1.50	0.010	0.005	0.000	**0.015**
2.00	0.012	0.006	0.880	**0.898**
2.10	0.012	0.007	9.800	**9.819**
3.00	0.014	0.009	23.400	**23.424**

Flowline above Basin Bottom (ft)	Horizontal from 3:1 Side Slopes	Area (sq ft)	Surface Volume (cu-ft)	Surface Volume (ac-ft)
	-	-	-	-
	-	-	-	-
0.00	3.00	1890	0	0.0000
0.50	3.00	2028	980	0.0225
0.75	3.00	2170	1504	0.0345
1.00	3.00	2316	2065	0.0474
1.50	3.00	2622	3300	0.0757
2.00	3.00	2950	4693	0.1077

Hydrologic Soil Group—San Diego County Area, California
(Jamul Retail Center)

Map Scale: 1:2,450 if printed on A portrait (8.5" x 11") sheet.

N

Meters: 0 35 70 140 210

Feet: 0 100 200 400 600

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 11N WGS84

MAP LEGEND

Area of Interest (AOI)

Area of Interest (AOI)

Soils

Soil Rating Polygons

A
A/D
B
B/D
C
C/D
D
Not rated or not available

Soil Rating Lines

A
A/D
B
B/D
C
C/D
D
Not rated or not available

Soil Rating Points

A
A/D
B
B/D
C
C/D
D
Not rated or not available

Water Features

Streams and Canals

Transportation

Rails
Interstate Highways
US Routes
Major Roads
Local Roads

Background

Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: San Diego County Area, California
Survey Area Data: Version 12, Sep 13, 2017

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Dec 31, 2009—Mar 11, 2017

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
CmrG	Cieneba very rocky coarse sandy loam, 30 to 75 percent slopes	D	4.4	16.8%
FaC2	Fallbrook sandy loam, 5 to 9 percent slopes, eroded	C	3.4	13.1%
FaE2	Fallbrook sandy loam, 15 to 30 percent slopes, eroded	C	0.3	1.0%
PeD2	Placentia sandy loam, 9 to 15 percent slopes, eroded	D	0.9	3.3%
PfC	Placentia sandy loam, thick surface, 2 to 9 percent slo pes	D	0.0	0.1%
RaC2	Ramona sandy loam, 5 to 9 percent slopes, eroded	C	12.2	46.9%
RaD2	Ramona sandy loam, 9 to 15 percent slopes, eroded	C	4.9	18.7%
Totals for Area of Interest			**26.0**	**100.0%**

Description

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The soils in the United States are assigned to four groups (A, B, C, and D) and three dual classes (A/D, B/D, and C/D). The groups are defined as follows:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. Only the soils that in their natural condition are in group D are assigned to dual classes.

Rating Options

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

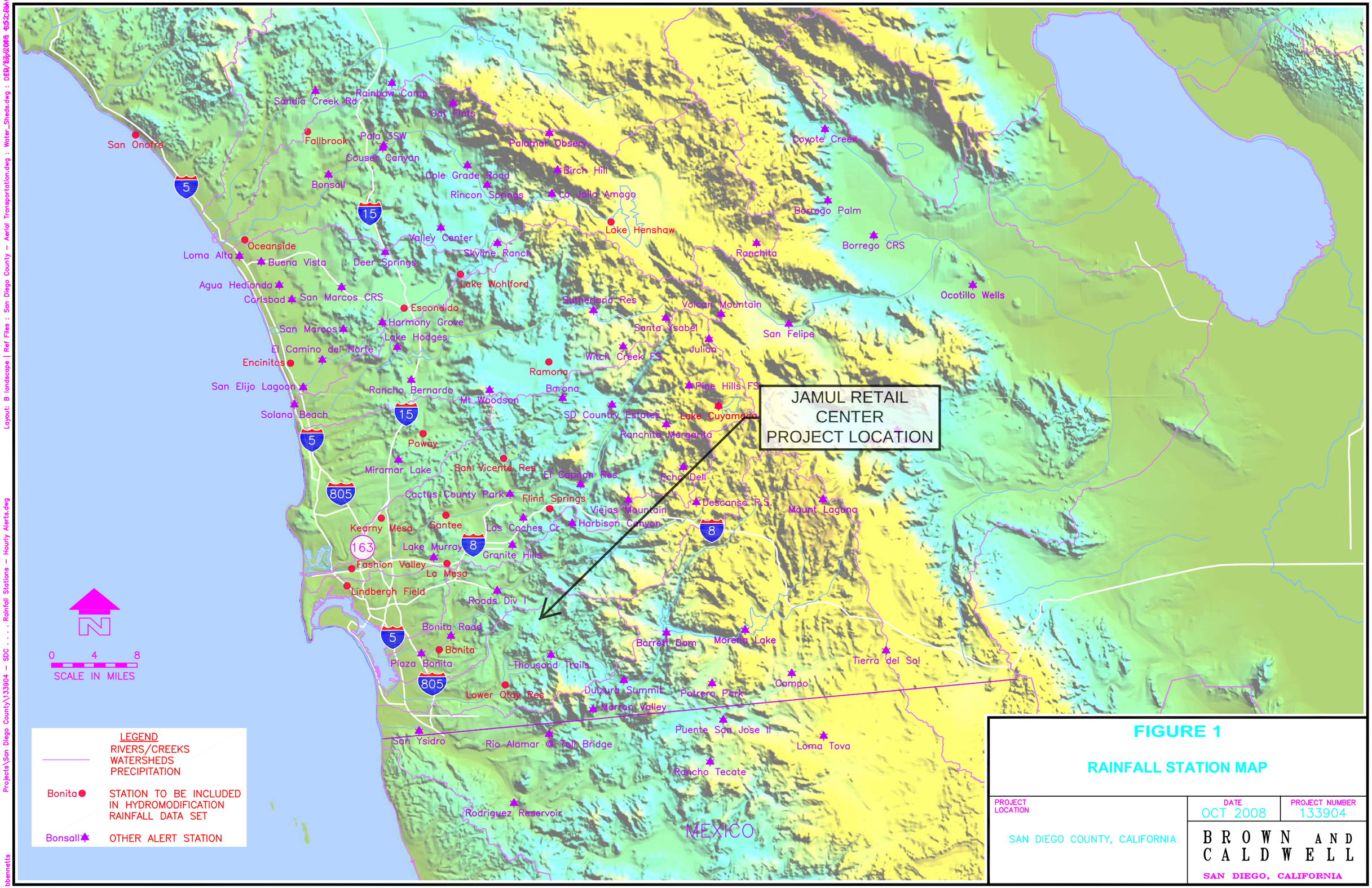


FIGURE 1

RAINFALL STATION MAP

PROJECT LOCATION	DATE	PROJECT NUMBER
SAN DIEGO COUNTY, CALIFORNIA	OCT 2008	133904

BROWN AND CALDWELL
SAN DIEGO, CALIFORNIA

SWMM Model Outputs

- POC-1

    -Pre-development Output Report

    -Post-development Output Report

    -Flow Frequency Curve

    -Flow Frequency Table

    -Flow Duration Curve

    -Flow Duration Table

EPA STORM WATER MANAGEMENT MODEL - VERSION 5.1 (Build 5.1.010)

JAMUL RETAIL CENTER
POC-1 PRE-DEVELOPMENT CONDITION
J-18145

****
NOTE: The summary statistics displayed in this report are
based on results found at every computational time step,
not just on results from each reporting time step.
****

****
Analysis Options
****
Flow Units ..... CFS
Process Models:
  Rainfall/Runoff ..... YES
  RDII ..... NO
  Snowmelt ..... NO
  Groundwater ..... NO
  Flow Routing ..... NO
  Water Quality ..... NO
Infiltration Method ..... GREEN_AMPT
Starting Date OCT-03-1970 05:00:00
Ending Date MAY-25-2008 22:00:00
Antecedent Dry Days 0.0
Report Time Step 01:00:00
Wet Time Step 00:15:00
Dry Time Step 04:00:00

Runoff Quantity Continuity	Volume acre-feet	Depth inches
Total Precipitation	279.733	339.070
Evaporation Loss	2.781	3.371
Infiltration Loss	267.848	324.665
Surface Runoff	10.528	12.762
Final Storage	0.000	0.000
Continuity Error (%)	-0.509	

Flow Routing Continuity	Volume acre-feet	Volume 10^6 gal
Dry Weather Inflow	0.000	0.000
Wet Weather Inflow	10.528	3.431
Groundwater Inflow	0.000	0.000
RDII Inflow	0.000	0.000
External Inflow	0.000	0.000
External Outflow	10.528	3.431
Flooding Loss	0.000	0.000
Evaporation Loss	0.000	0.000
Exfiltration Loss	0.000	0.000
Initial Stored Volume	0.000	0.000
Final Stored Volume	0.000	0.000
Continuity Error (%)	0.000	

****
Subcatchment Runoff Summary
****

Subcatchment	Total Precip in	Total Runon in	Total Evap in	Total Infil in	Total Runoff in	Total Runoff 10^6 gal	Peak Runoff CFS	Runoff Coeff
Pre1	339.07	0.00	3.37	324.71	12.71	2.62	7.24	0.037
Pre2	339.07	0.00	3.36	324.52	12.94	0.81	2.21	0.038

Analysis begun on: Wed Jul 11 09:59:56 2018
Analysis ended on: Wed Jul 11 10:00:05 2018
Total elapsed time: 00:00:09

```
EPA STORM WATER MANAGEMENT MODEL - VERSION 5.1 (Build 5.1.010)
--------------------------------------------------------------

JAMUL RETAIL CENTER
POC-1 POST-DEVELOPMENT CONDITION
J-18145
WARNING 04: minimum elevation drop used for Conduit UD1
WARNING 04: minimum elevation drop used for Conduit BP1
WARNING 04: minimum elevation drop used for Conduit BP2
WARNING 04: minimum elevation drop used for Conduit BP3
WARNING 04: minimum elevation drop used for Conduit UD2
WARNING 04: minimum elevation drop used for Conduit UD3

***********************************************************
NOTE: The summary statistics displayed in this report are
based on results found at every computational time step,
not just on results from each reporting time step.
***********************************************************

*****************
Analysis Options
*****************
Flow Units ............... CFS
Process Models:
  Rainfall/Runoff ........ YES
  RDII ................... NO
  Snowmelt ............... NO
  Groundwater ............ NO
  Flow Routing ........... YES
  Ponding Allowed ........ NO
  Water Quality .......... NO
Infiltration Method ...... GREEN_AMPT
Flow Routing Method ...... KINWAVE
Starting Date ............ OCT-03-1970 05:00:00
Ending Date .............. MAY-25-2008 22:00:00
Antecedent Dry Days ...... 0.0
Report Time Step ......... 01:00:00
Wet Time Step ............ 00:15:00
Dry Time Step ............ 04:00:00
Routing Time Step ........ 60.00 sec


**************************        Volume         Depth
Runoff Quantity Continuity     acre-feet        inches
**************************     ---------       -------
Initial LID Storage ......         0.056         0.067
Total Precipitation ......       281.056       339.070
Evaporation Loss .........        51.973        62.701
Infiltration Loss ........        93.440       112.728
Surface Runoff ...........        21.214        25.593
LID Drainage .............       116.329       140.341
Final Storage ............         0.056         0.067
Continuity Error (%) .....        -0.676


**************************        Volume         Volume
Flow Routing Continuity        acre-feet      10^6 gal
**************************     ---------      ---------
Dry Weather Inflow .......         0.000         0.000
Wet Weather Inflow .......       137.544        44.821
Groundwater Inflow .......         0.000         0.000
RDII Inflow ..............         0.000         0.000
External Inflow ..........         0.000         0.000
External Outflow .........       136.195        44.381
Flooding Loss ............         0.000         0.000
Evaporation Loss .........         1.347         0.439
Exfiltration Loss ........         0.000         0.000
Initial Stored Volume ....         0.000         0.000
Final Stored Volume ......         0.000         0.000
Continuity Error (%) .....         0.001


*********************************
Highest Flow Instability Indexes
*********************************
All links are stable.


************************
Routing Time Step Summary
```

```
**************************
Minimum Time Step           :    60.00 sec
Average Time Step           :    60.00 sec
Maximum Time Step           :    60.00 sec
Percent in Steady State     :     0.00
Average Iterations per Step :     1.00
Percent Not Converging      :     0.00
```

Subcatchment Runoff Summary

Subcatchment	Total Precip in	Total Runon in	Total Evap in	Total Infil in	Total Runoff in	Total Runoff 10^6 gal	Peak Runoff CFS	Runoff Coeff
DMA4	339.07	0.00	3.31	317.67	19.34	1.10	2.15	0.057
DMA5	339.07	0.00	3.60	323.33	12.62	0.14	0.30	0.037
DMA1-1	339.07	0.00	70.79	25.50	244.64	21.92	3.61	0.722
DMA1-2	339.07	0.00	58.73	47.53	237.96	1.94	0.33	0.702
DMA2-1	339.07	0.00	65.13	31.76	245.47	14.00	2.30	0.724
DMA2-2	339.07	0.00	58.50	47.52	238.41	1.29	0.22	0.703
DMA3-1	339.07	0.00	43.54	127.95	170.56	5.09	1.17	0.503
DMA3-2	339.07	0.00	58.67	47.47	238.15	1.29	0.22	0.702
LID1	339.07	6075.61	622.27	0.00	5792.39	22.75	4.06	0.903
LID2	339.07	7972.51	646.17	0.00	7665.42	14.70	2.60	0.922
LID3	339.07	7453.80	643.83	0.00	7149.00	6.13	1.31	0.917

LID Performance Summary

Subcatchment	LID Control	Total Inflow in	Evap Loss in	Infil Loss in	Surface Outflow in	Drain Outflow in	Initial Storage in	Final Storage in	Continuity Error %
LID1	LID1	6414.68	622.29	0.00	771.20	5021.40	2.70	2.70	-0.00
LID2	LID2	8311.58	646.20	0.00	1050.49	6615.20	2.70	2.70	-0.00
LID3	LID3	7792.87	643.85	0.00	733.88	6415.40	2.70	2.70	-0.00

Node Depth Summary

Node	Type	Average Depth Feet	Maximum Depth Feet	Maximum HGL Feet	Time of Max Occurrence days hr:min	Reported Max Depth Feet
POC-1	OUTFALL	0.00	0.00	0.00	0 00:00	0.00
DIV1	DIVIDER	0.00	0.00	0.00	0 00:00	0.00
DIV2	DIVIDER	0.00	0.00	0.00	0 00:00	0.00
DIV3	DIVIDER	0.00	0.00	0.00	0 00:00	0.00
STOR3	STORAGE	0.01	1.74	1.74	5532 14:24	1.63
STOR2	STORAGE	0.01	2.12	2.12	5532 14:03	2.12
STOR1	STORAGE	0.02	2.07	2.07	8141 05:25	2.06

Node Inflow Summary

Node	Type	Maximum Lateral Inflow CFS	Maximum Total Inflow CFS	Time of Max Occurrence days hr:min	Lateral Inflow Volume 10^6 gal	Total Inflow Volume 10^6 gal	Flow Balance Error Percent

POC-1	OUTFALL	2.45	2.66	5532	14:01	1.24	44.4	0.000
DIV1	DIVIDER	4.06	4.06	4532	12:01	22.7	22.7	0.000
DIV2	DIVIDER	2.60	2.60	4532	12:01	14.7	14.7	0.000
DIV3	DIVIDER	1.31	1.31	4532	12:16	6.13	6.13	0.000
STOR3	STORAGE	0.00	1.29	4532	12:16	0	0.63	0.016
STOR2	STORAGE	0.00	2.57	4532	12:01	0	2.02	0.012
STOR1	STORAGE	0.00	4.03	4532	12:01	0	3.02	0.001

****
Node Surcharge Summary
****

Surcharging occurs when water rises above the top of the highest conduit.

Node	Type	Hours Surcharged	Max. Height Above Crown Feet	Min. Depth Below Rim Feet
DIV1	DIVIDER	329993.00	0.000	3.000
DIV2	DIVIDER	329993.00	0.000	3.000
DIV3	DIVIDER	329993.00	0.000	3.000
STOR3	STORAGE	329993.00	1.737	1.263
STOR2	STORAGE	329993.00	2.119	0.881
STOR1	STORAGE	329993.00	2.074	0.926

****
Node Flooding Summary
****

No nodes were flooded.

****
Storage Volume Summary
****

Storage Unit	Average Volume 1000 ft3	Avg Pcnt Full	Evap Pcnt Loss	Exfil Pcnt Loss	Maximum Volume 1000 ft3	Max Pcnt Full	Time of Max Occurrence days hr:min	Maximum Outflow CFS
STOR3	0.012	0	6	0	3.942	49	5532 14:23	0.43
STOR2	0.025	0	3	0	8.188	65	5532 14:03	1.35
STOR1	0.164	1	11	0	19.340	64	8141 05:24	0.72

****
Outfall Loading Summary
****

Outfall Node	Flow Freq Pcnt	Avg Flow CFS	Max Flow CFS	Total Volume 10^6 gal
POC-1	18.01	0.03	2.66	44.378
System	18.01	0.03	2.66	44.378

****
Link Flow Summary
****

Link	Type	Maximum |Flow| CFS	Time of Max Occurrence days hr:min	Maximum |Veloc| ft/sec	Max/ Full Flow	Max/ Full Depth
UD1	DUMMY	0.03	4532 12:01			
BP1	DUMMY	4.03	4532 12:01			
BP2	DUMMY	2.57	4532 12:01			
BP3	DUMMY	1.29	4532 12:16			
UD2	DUMMY	0.03	79 06:29			
UD3	DUMMY	0.02	79 11:17			
MF1	DUMMY	0.72	8141 05:25			
MF2	DUMMY	1.35	5532 14:03			
MF3	DUMMY	0.43	5532 14:24			

****
Conduit Surcharge Summary
****

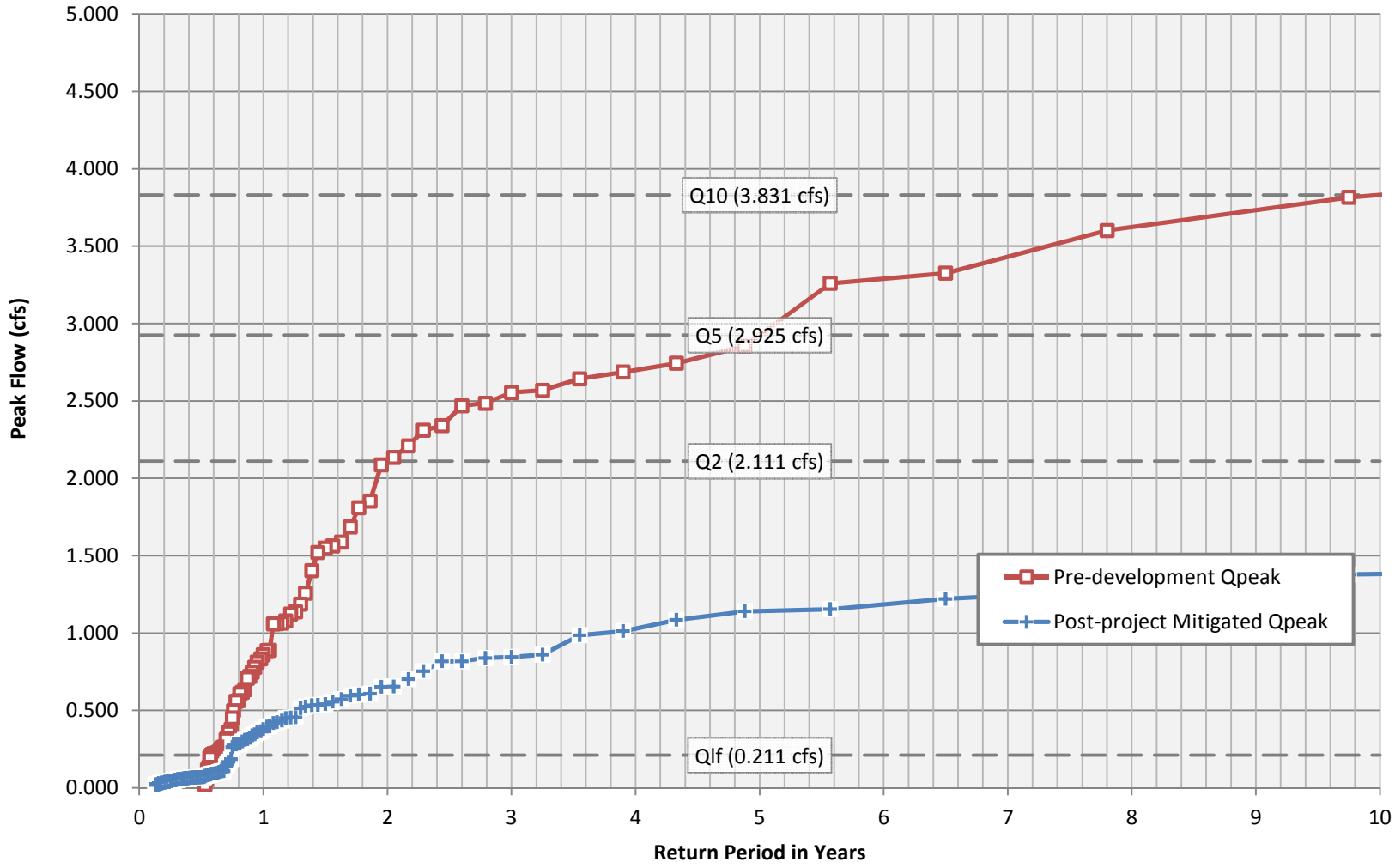
No conduits were surcharged.

Analysis begun on: Wed Jul 11 10:01:05 2018
Analysis ended on: Wed Jul 11 10:01:39 2018
Total elapsed time: 00:00:34

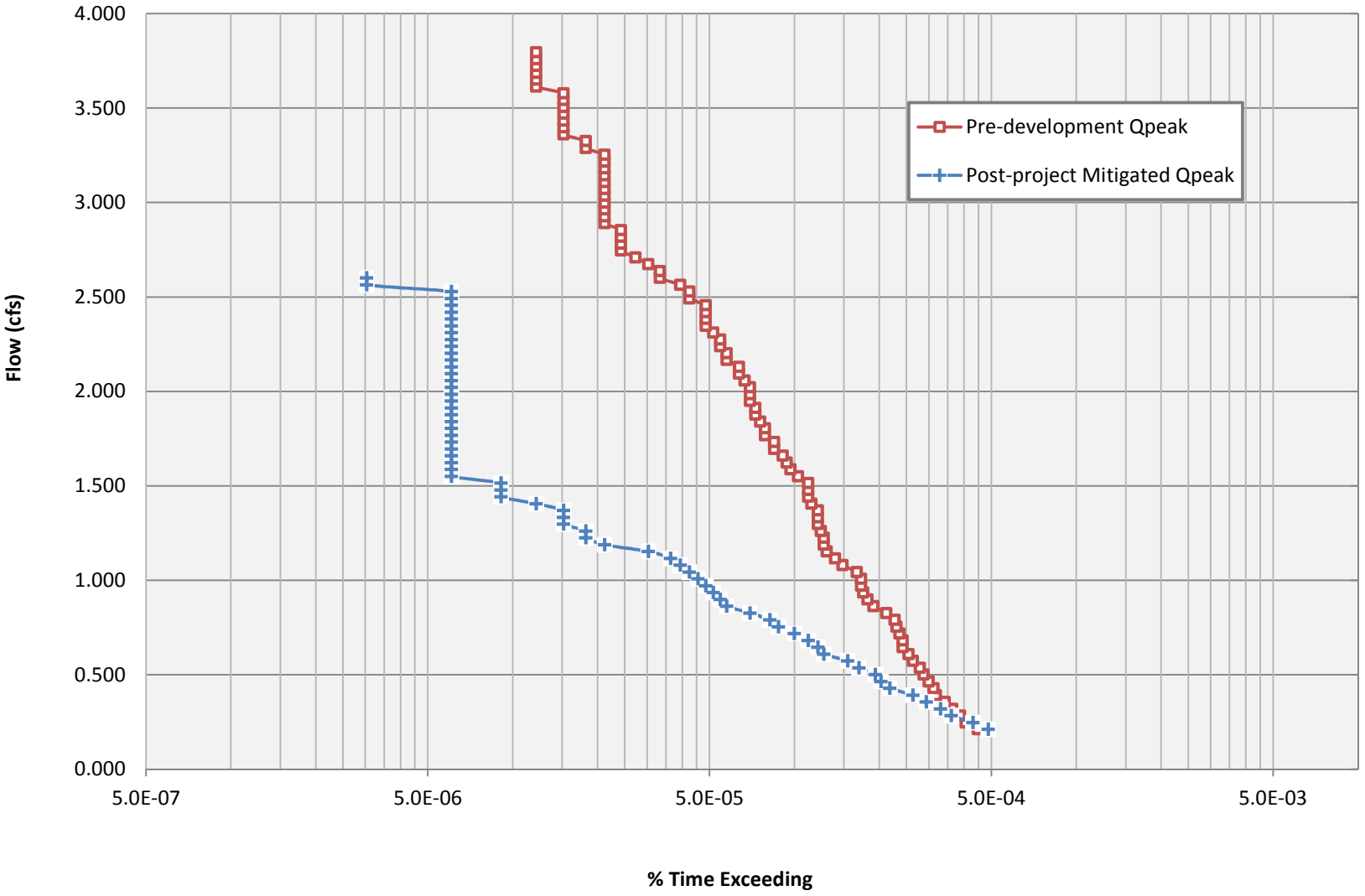
Peak Flow Frequency Summary- POC 1

Return Period	Pre-development Qpeak (cfs)	Post-project - Mitigated Q (cfs)
LF = 0.1*Q2	0.211	0.065
2-year	2.111	0.654
3-year	2.554	0.846
4-year	2.699	1.029
5-year	2.925	1.142
6-year	3.290	1.185
7-year	3.431	1.242
8-year	3.623	1.286
9-year	3.733	1.339
10-year	3.831	1.381

Peak Flow Frequency Curves - POC 1



Flow Duration Curves - POC 1

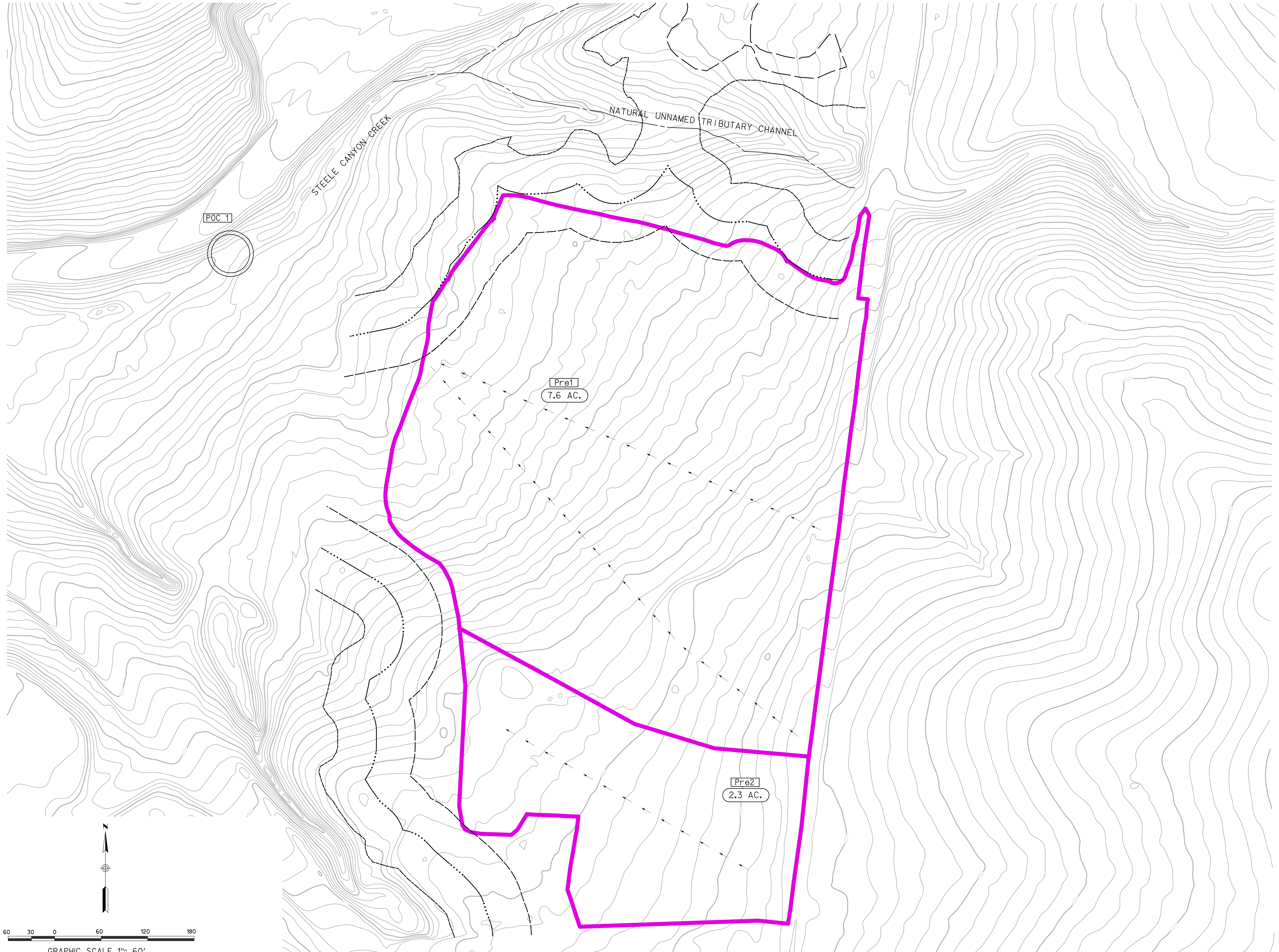


Low-flow Threshold:	10%	
0.1xQ2 (Pre):	0.211	cfs
Q10 (Pre):	3.831	cfs
Ordinate #:	100	
Incremental Q (Pre):	0.03620	cfs
Total Hourly Data:	329993	hours

The proposed BMP: PASSED

Beginning of Interval	Pre-develop. Flow (cfs)	Pre-develop. Hours	Pre-develop. % Time Exceeding	Post-project Hours	Post-project % Time Exceeding	Percentage	Pass/Fail
1	0.211	148	4.48E-04	161	4.88E-04	109%	*Pass^*
2	0.247	134	4.06E-04	142	4.30E-04	106%	*Pass^*
3	0.283	128	3.88E-04	119	3.61E-04	93%	Pass
4	0.320	120	3.64E-04	109	3.30E-04	91%	Pass
5	0.356	113	3.42E-04	97	2.94E-04	86%	Pass
6	0.392	105	3.18E-04	87	2.64E-04	83%	Pass
7	0.428	103	3.12E-04	72	2.18E-04	70%	Pass
8	0.464	99	3.00E-04	67	2.03E-04	68%	Pass
9	0.501	95	2.88E-04	64	1.94E-04	67%	Pass
10	0.537	92	2.79E-04	56	1.70E-04	61%	Pass
11	0.573	87	2.64E-04	51	1.55E-04	59%	Pass
12	0.609	84	2.55E-04	42	1.27E-04	50%	Pass
13	0.645	80	2.42E-04	40	1.21E-04	50%	Pass
14	0.682	80	2.42E-04	37	1.12E-04	46%	Pass
15	0.718	78	2.36E-04	33	1.00E-04	42%	Pass
16	0.754	76	2.30E-04	29	8.79E-05	38%	Pass
17	0.790	75	2.27E-04	27	8.18E-05	36%	Pass
18	0.826	70	2.12E-04	23	6.97E-05	33%	Pass
19	0.863	63	1.91E-04	19	5.76E-05	30%	Pass
20	0.899	60	1.82E-04	18	5.45E-05	30%	Pass
21	0.935	58	1.76E-04	17	5.15E-05	29%	Pass
22	0.971	57	1.73E-04	16	4.85E-05	28%	Pass
23	1.008	57	1.73E-04	15	4.55E-05	26%	Pass
24	1.044	55	1.67E-04	14	4.24E-05	25%	Pass
25	1.080	49	1.48E-04	13	3.94E-05	27%	Pass
26	1.116	46	1.39E-04	12	3.64E-05	26%	Pass
27	1.152	43	1.30E-04	10	3.03E-05	23%	Pass
28	1.189	42	1.27E-04	7	2.12E-05	17%	Pass
29	1.225	42	1.27E-04	6	1.82E-05	14%	Pass
30	1.261	41	1.24E-04	6	1.82E-05	15%	Pass
31	1.297	40	1.21E-04	5	1.52E-05	13%	Pass
32	1.333	40	1.21E-04	5	1.52E-05	13%	Pass
33	1.370	40	1.21E-04	5	1.52E-05	13%	Pass
34	1.406	38	1.15E-04	4	1.21E-05	11%	Pass
35	1.442	37	1.12E-04	3	9.09E-06	8%	Pass
36	1.478	37	1.12E-04	3	9.09E-06	8%	Pass
37	1.514	37	1.12E-04	3	9.09E-06	8%	Pass
38	1.551	34	1.03E-04	2	6.06E-06	6%	Pass
39	1.587	32	9.70E-05	2	6.06E-06	6%	Pass
40	1.623	31	9.39E-05	2	6.06E-06	6%	Pass
41	1.659	30	9.09E-05	2	6.06E-06	7%	Pass
42	1.695	28	8.49E-05	2	6.06E-06	7%	Pass
43	1.732	28	8.49E-05	2	6.06E-06	7%	Pass
44	1.768	26	7.88E-05	2	6.06E-06	8%	Pass
45	1.804	26	7.88E-05	2	6.06E-06	8%	Pass
46	1.840	25	7.58E-05	2	6.06E-06	8%	Pass
47	1.876	24	7.27E-05	2	6.06E-06	8%	Pass
48	1.913	24	7.27E-05	2	6.06E-06	8%	Pass
49	1.949	23	6.97E-05	2	6.06E-06	9%	Pass
50	1.985	23	6.97E-05	2	6.06E-06	9%	Pass
51	2.021	23	6.97E-05	2	6.06E-06	9%	Pass
52	2.057	22	6.67E-05	2	6.06E-06	9%	Pass
53	2.094	21	6.36E-05	2	6.06E-06	10%	Pass
54	2.130	21	6.36E-05	2	6.06E-06	10%	Pass
55	2.166	19	5.76E-05	2	6.06E-06	11%	Pass
56	2.202	19	5.76E-05	2	6.06E-06	11%	Pass
57	2.238	18	5.45E-05	2	6.06E-06	11%	Pass
58	2.275	18	5.45E-05	2	6.06E-06	11%	Pass
59	2.311	17	5.15E-05	2	6.06E-06	12%	Pass
60	2.347	16	4.85E-05	2	6.06E-06	13%	Pass
61	2.383	16	4.85E-05	2	6.06E-06	13%	Pass
62	2.419	16	4.85E-05	2	6.06E-06	13%	Pass
63	2.456	16	4.85E-05	2	6.06E-06	13%	Pass

Beginning of Interval	Pre-develop. Flow (cfs)	Pre-develop. Hours	Pre-develop. % Time Exceeding	Post-project Hours	Post-project % Time Exceeding	Percentage	Pass/Fail
64	2.492	14	4.24E-05	2	6.06E-06	14%	Pass
65	2.528	14	4.24E-05	2	6.06E-06	14%	Pass
66	2.564	13	3.94E-05	1	3.03E-06	8%	Pass
67	2.600	11	3.33E-05	1	3.03E-06	9%	Pass
68	2.637	11	3.33E-05	0	0.00E+00	0%	Pass
69	2.673	10	3.03E-05	0	0.00E+00	0%	Pass
70	2.709	9	2.73E-05	0	0.00E+00	0%	Pass
71	2.745	8	2.42E-05	0	0.00E+00	0%	Pass
72	2.781	8	2.42E-05	0	0.00E+00	0%	Pass
73	2.818	8	2.42E-05	0	0.00E+00	0%	Pass
74	2.854	8	2.42E-05	0	0.00E+00	0%	Pass
75	2.890	7	2.12E-05	0	0.00E+00	0%	Pass
76	2.926	7	2.12E-05	0	0.00E+00	0%	Pass
77	2.962	7	2.12E-05	0	0.00E+00	0%	Pass
78	2.999	7	2.12E-05	0	0.00E+00	0%	Pass
79	3.035	7	2.12E-05	0	0.00E+00	0%	Pass
80	3.071	7	2.12E-05	0	0.00E+00	0%	Pass
81	3.107	7	2.12E-05	0	0.00E+00	0%	Pass
82	3.143	7	2.12E-05	0	0.00E+00	0%	Pass
83	3.180	7	2.12E-05	0	0.00E+00	0%	Pass
84	3.216	7	2.12E-05	0	0.00E+00	0%	Pass
85	3.252	7	2.12E-05	0	0.00E+00	0%	Pass
86	3.288	6	1.82E-05	0	0.00E+00	0%	Pass
87	3.324	6	1.82E-05	0	0.00E+00	0%	Pass
88	3.361	5	1.52E-05	0	0.00E+00	0%	Pass
89	3.397	5	1.52E-05	0	0.00E+00	0%	Pass
90	3.433	5	1.52E-05	0	0.00E+00	0%	Pass
91	3.469	5	1.52E-05	0	0.00E+00	0%	Pass
92	3.505	5	1.52E-05	0	0.00E+00	0%	Pass
93	3.542	5	1.52E-05	0	0.00E+00	0%	Pass
94	3.578	5	1.52E-05	0	0.00E+00	0%	Pass
95	3.614	4	1.21E-05	0	0.00E+00	0%	Pass
96	3.650	4	1.21E-05	0	0.00E+00	0%	Pass
97	3.686	4	1.21E-05	0	0.00E+00	0%	Pass
98	3.723	4	1.21E-05	0	0.00E+00	0%	Pass
99	3.759	4	1.21E-05	0	0.00E+00	0%	Pass
100	3.795	4	1.21E-05	0	0.00E+00	0%	Pass



NOTES

1. UNDERLYING HYDROLOGIC SOIL GROUP: TYPE "C"
2. PURSUANT TO THE PROJECT'S GEOTECHNICAL REPORT, GROUNDWATER IS EXPECTED TO BE DEEPER THAN 50 FEET BELOW EXISTING GROUND. GROUNDWATER WAS NOT ENCOUNTERED DURING THE SOILS INVESTIGATION.
3. POTENTIAL CRITICAL COURSE SEDIMENT YIELD AREAS (PCCSYA)LOCATED OFF-SITE AND NO ASSOCIATED NEGATIVE IMPACTS ARE EXPECTED TO OCCUR AS A RESULT OF THIS DEVELOPMENT, PLEASE SEE ATTACHMENT 3C FOR MORE DETAILS.
4. TWO DMAS ARE USED IN PRE-DEVELOPMENT CONDITION TO BETTER REPRESENT A DIFFERENCE IN SLOPES WHILE STILL ULTIMATELY FLOWING TO THE POC-1.
5. POC-1 IS LOCATED OFF-SITE APROXIMATELY 200 LINEAR FEET NORTHWEST WHERE ALL RUNOFF FROM THE PROJECT SITE WILL HAVE SHEET FLOWED INTO THE UNNAMED CHANNEL.

LEGEND

(line)	DRAINAGE MANAGEMENT AREA (DMA) BOUNDARY
XX.X AC.	TRIBUTARY AREA TO DRAINAGE MANAGEMENT AREA
DMA-X	DRAINAGE MANAGEMENT AREA ID (FOR USE IN EPA SWMM)
(circle)	POINT OF COMPLIANCE (POC)
→ → →	FLOW ARROWS

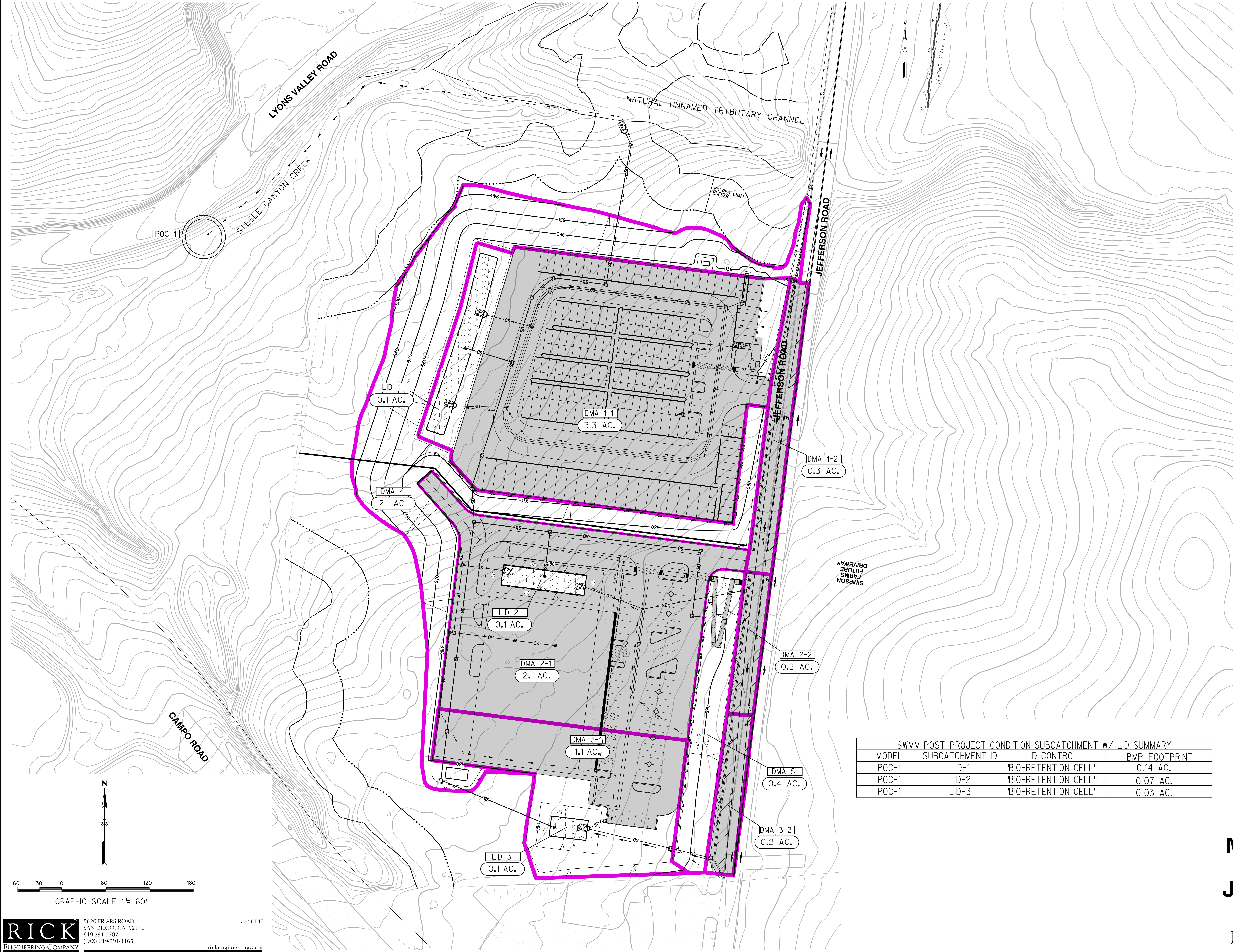
HYDROMODIFICATION MANAGEMENT EXHIBIT FOR JAMUL RETAIL CENTER (PRE-DEVELOPMENT)

J-18145 Date: July 10, 2018

RICK ENGINEERING COMPANY
San Diego
5620 FRIARS ROAD
SAN DIEGO, CA 92110
619-291-0707
(FAX) 619-291-4165
rickengineering.com
Riverside - Orange - Sacramento - San Luis Obispo - Phoenix - Tucson - Denver

J-18145

NOT FOR CONSTRUCTION - EXHIBIT FOR PRELIMINARY PDP SWQMP



NOTES

1. UNDERLYING HYDROLOGIC SOIL GROUP: TYPE "C"
2. PURSUANT TO THE PROJECT'S GEOTECHNICAL REPORT, GROUNDWATER IS EXPECTED TO BE DEEPER THAN 50 FEET BELOW EXISTING GROUND. GROUNDWATER WAS NOT ENCOUNTERED DURING THE SOILS INVESTIGATION.
3. POTENTIAL CRITICAL COURSE SEDIMENT YIELD AREAS (PCCSYA)LOCATED OFF-SITE AND NO NEGATIVE IMPACTS ARE EXPECTED TO OCCUR AS A RESULT OF THIS DEVELOPMENT. PLEASE SEE ATTACHMENT 2C FOR MORE DETAILS.
4. FOR COMPARISON, POC-1 IS THE POINT OF COMPLIANCE FOR THE PROJECT SITE. THE POC IS THE DISCHARGE POINT FOR THE PROJECT INTO THE EXISTING NATRUAL CHANNEL.

LEGEND

- DRAINAGE MANAGEMENT AREA (DMA) BOUNDARY
- XX.X AC. — TRIBUTARY AREA TO DRAINAGE MANAGEMENT AREA
- BMP-X — STRUCTURAL BMP
- IMPERVIOUS AREA
- LOCATION OF BIOFILTRATION BASIN
- DMA-X — DRAINAGE MANAGEMENT AREA ID (FOR USE IN EPA SWMM)
- POINT OF COMPLIANCE (POC)
- FLOW PATH

SWMM POST-PROJECT CONDITION SUBCATCHMENT W/ LID SUMMARY			
MODEL	SUBCATCHMENT ID	LID CONTROL	BMP FOOTPRINT
POC-1	LID-1	"BIO-RETENTION CELL"	0.14 AC.
POC-1	LID-2	"BIO-RETENTION CELL"	0.07 AC.
POC-1	LID-3	"BIO-RETENTION CELL"	0.03 AC.

HYDROMODIFICATION MANAGEMENT EXHIBIT FOR JAMUL RETAIL CENTER (POST-PROJECT)

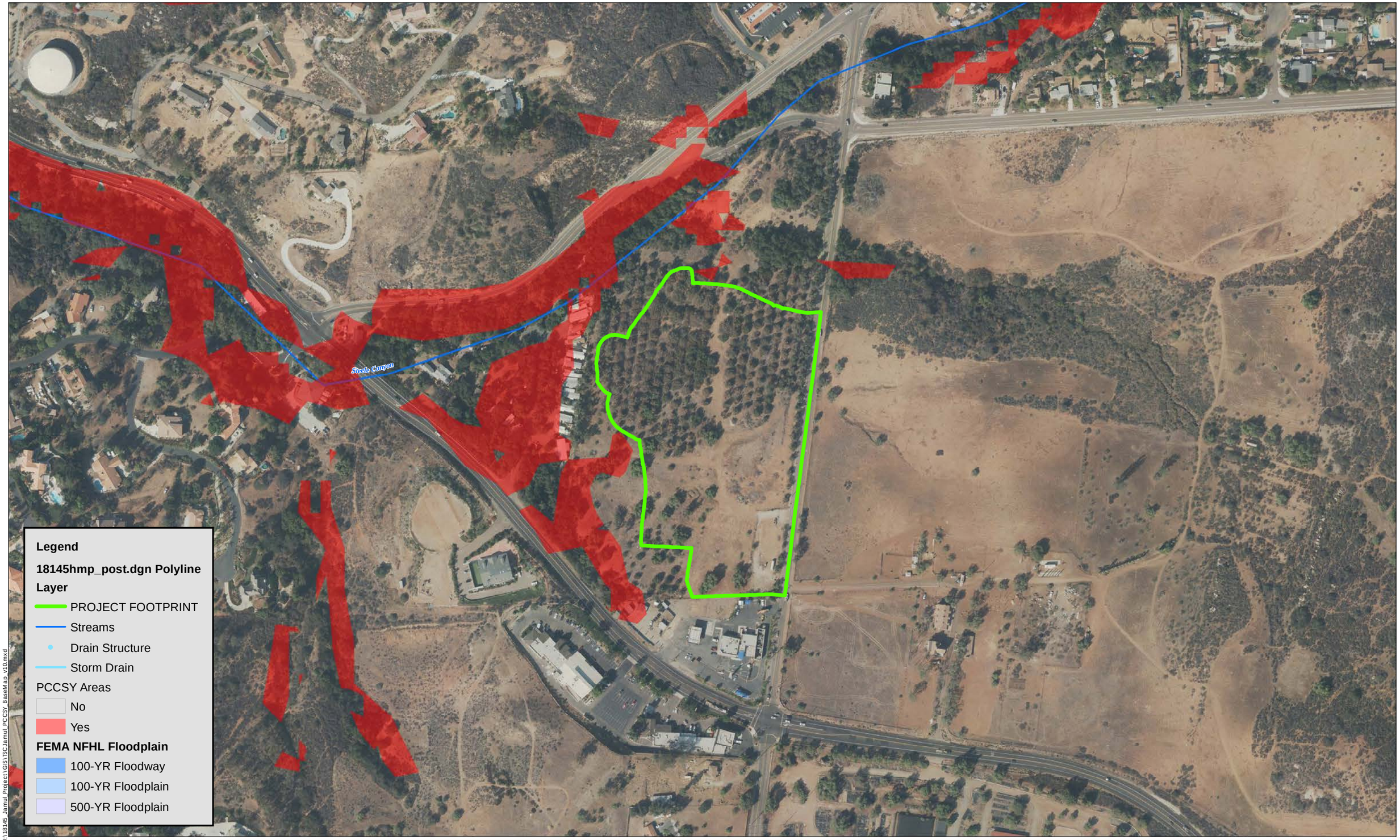
J-18145

Date: March 26, 2018
Revised: July 10, 2018

RICK ENGINEERING COMPANY
San Diego
5620 FRIARS ROAD
SAN DIEGO, CA 92110
619-291-0707
(FAX) 619-291-4165
rickengineering.com
Riverside · Orange · Sacramento · San Luis Obispo · Phoenix · Tucson · Denver

J-18145

NOT FOR CONSTRUCTION - EXHIBIT FOR PRELIMINARY PDP SWQMP



J:\18145 Jamul Project\GIS\TSC\Jamul_PCCSY_BaseMap_v10.mxd

RICK ENGINEERING COMPANY

Scale in Feet
0 250 500
North

Date of Exhibit: 2/14/2018
SanGIS PCCSY: 03/2015
FEMA NFHL: 04/2016
SanGIS/USGS Aerial Imagery: 11/2014

Jamul Retail Center

Potential Critical Coarse Sediment Yield Areas

JN: 18145

ATTACHMENT 3

Structural BMP Maintenance Information

This is the cover sheet for Attachment 3.

Indicate which Items are Included behind this cover sheet:

Attachment Sequence	Contents	Checklist
Attachment 3a	Structural BMP Maintenance Plan (Required)	☒ Included See Structural BMP Maintenance Information Checklist on the back of this Attachment cover sheet.
Attachment 3b	Draft Stormwater Maintenance Notification / Agreement (when applicable)	☐ Included ☐ Not Applicable

Use this checklist to ensure the required information has been included in the Structural BMP Maintenance Information Attachment:

Attachment 3a must identify:

- ☒ Specific maintenance indicators and actions for proposed structural BMP(s). This must be based on Section 7.7 of the BMP Design Manual and enhanced to reflect actual proposed components of the structural BMP(s)
- ☒ How to access the structural BMP(s) to inspect and perform maintenance
- ☒ Features that are provided to facilitate inspection (e.g., observation ports, cleanouts, silt posts, or other features that allow the inspector to view necessary components of the structural BMP and compare to maintenance thresholds)
- ☐ Manufacturer and part number for proprietary parts of structural BMP(s) when applicable
- ☒ Maintenance thresholds specific to the structural BMP(s), with a location-specific frame of reference (e.g., level of accumulated materials that triggers removal of the materials, to be identified based on viewing marks on silt posts or measured with a survey rod with respect to a fixed benchmark within the BMP)
- ☒ Recommended equipment to perform maintenance
- ☐ When applicable, necessary special training or certification requirements for inspection and maintenance personnel such as confined space entry or hazardous waste management

Attachment 3b: For all Structural BMPs, Attachment 3b must include a draft maintenance agreement in the County's standard format depending on the Category (PDP applicant to contact County staff to obtain the current maintenance agreement forms). Refer to Section 7.3 in the BMP Design Manual for a description of the different categories.

BMP DESCRIPTION		POST-CONSTRUCTION PERMANENT BMP OPERATION & MAINTENANCE PROCEDURE DETAILS[1] O&M RESPONSIBLE PARTY DESIGNEE: PROPERTY OWNER INSPECTION FREQUENCY[2]	MAINTENANCE FREQUENCY	MAINTENANCE METHOD
SITE DESIGN	LANDSCAPED AREAS	MONTHLY (NOTE: INSPECTOR SHALL CHECK FOR THE FOLLOWING MAINTENANCE INDICATORS: EROSION IN THE FORM OF RILLS OR GULLIES, PONDING WATER, BARE AREAS, ANIMAL BURROWS, HOLES, MOUNDS, AND TRASH)	1. AS DETERMINED BY INSPECTION; AND 2. ON OR BEFORE SEPTEMBER 30TH.	1. FILL AND COMPACT AREAS OF RUTS, RILLS, OR GULLIES; 2. RE-SEED AND/OR PLANT SLOPES AND AREAS OF EXPOSED SOILS; AND 3. ROUTINE MOWING AND TRIMMING AND TRASH REMOVAL.
	AMENDED SOILS	MONTHLY (NOTE: INSPECTOR SHALL CHECK FOR THE FOLLOWING MAINTENANCE INDICATORS: EROSION IN THE FORM OF RILLS OR GULLIES, PONDING WATER, BARE AREAS, ANIMAL BURROWS, HOLES, MOUNDS, AND TRASH)	1. AS DETERMINED BY INSPECTION; AND 2. ON OR BEFORE SEPTEMBER 30TH.	1. REAPPLICATION OF AMENDED SOILS IF SIGNS OF COMPACTION, WATERLOGGING AND UNHEALTHY VEGETATION IS PRESENT 2. RE-SEED AND/OR PLANT SLOPES AND AREAS OF EXPOSED SOILS; AND 3. ROUTINE MOWING AND TRIMMING AND TRASH REMOVAL.
	ENERGY DISSIPATION	MONTHLY (NOTE: INSPECTOR SHALL CHECK FOR THE FOLLOWING MAINTENANCE INDICATORS: EROSION IN THE FORM OF RILLS OR GULLIES, PONDING WATER, BARE AREAS, ANIMAL BURROWS, HOLES, MOUNDS, AND TRASH)	1. AS DETERMINED BY INSPECTION; AND 2. ON OR BEFORE SEPTEMBER 30TH.	1. ROUTINE TRIM VEGETATION AND REMOVE TRASH IN AND AROUND THE ENERGY DISSIPATION AREA. 2. REAPPLY COBBLE TO ENERGY DISSIPATION AREA AS NEEDED.

		POST-CONSTRUCTION PERMANENT BMP OPERATION & MAINTENANCE PROCEDURE DETAILS[1]		
		O&M RESPONSIBLE PARTY DESIGNEE: PROPERTY OWNER		
BMP DESCRIPTION		**INSPECTION FREQUENCY[2]**	**MAINTENANCE FREQUENCY**	**MAINTENANCE METHOD**
SOURCE CONTROL	INTEGRATED PEST MANAGEMENT	MONTHLY (NOTE: INSPECTOR SHALL CHECK FOR INDICATIONS OF THE PRESENCE OF PESTS ON-SITE)	WHEN THE PEST OR PESTS, OBSERVED IN GREATEST ABUNDANCE OR CAUSE THE MOST OBSERVED SYMPTOMS, ARE IDENTIFIED.	CHECK FREQUENTLY FOR PESTS, AND TREAT WITH A PESTICIDE ONLY WHEN A PEST IS PRESENT, ETC.
	TRASH STORAGE AREAS	WEEKLY	1. AS DETERMINED BY INSPECTION; 2. STANDING WATER IN TRASH STORAGE AREA. 3. LOOSE TRASH OR DEBRIS. 4. LEAKED OR SPILLED MATERIALS. 5. COMPROMISED FENCE, SCREEN, GATE, WALL, BIN. LID OR ROOF AWNING (WHERE APPLICABLE). 6. CRACKED OR OTHERWISE COMPROMISED PAVING OR OTHER FLAWED FLOOR SURFACE (AS APPLICABLE).	1. IF STANDING WATER IS OBSERVED IN THE AREA, DETERMINE THE WATER SOURCE AND REMOVE THE SOURCE. ALLOW STANDING WATER TO EVAPORATE. IF WATER DOES NOT EVAPORATE IN 48 HOURS, REDISTRIBUTE THE WATER TO LANDSCAPED AREA(S). DO NOT DRAIN WATER TO STORM DRAIN SYSTEM. 2. REMOVE AND PROPERLY DISPOSE LOOSE TRASH, DEBRIS, AND LEAKED OR SPILLED MATERIALS. USE APPROPRIATE SPILL CLEANUP MATERIAL AS NECESSARY TO REMOVE ALL LEAKED AND SPILLED MATERIALS INCLUDING MATERIALS ADHERED TO PAVEMENT. IDENTIFY AND REMOVE OR REPAIR THE SOURCE OF ANY LEAKED OR SPILLED MATERIALS. 3. REPAIR THE FOLLOWING AS APPLICABLE: COMPROMISED FENCE, SCREEN, GATE, WALL, BIN, LID OR ROOF AWNING (WHERE APPLICABLE), CRACKED OR COMPROMISED PAVING OR OTHER FLOOR SURFACE (AS APPLICABLE).
	PREVENTIVE STENCILING AND SIGNAGE	ANNUALLY	WHEN FULLY OR PARTIALLY ERASED SIGNS ARE OBSERVED; WHEN DUMPING OF TRASH ARE OBSERVED AT PUBLIC ACCESS POINTS, BUILDING ENTRANCES, PUBLIC PARKS, ETC.	1. REPLACE OR REPAINT THE STENCILS AND SIGNAGE SO THAT THEY ARE LEGIBLE; AND 2. MAKE SURE THAT THEY ARE PLACED AT ALL REQUIRED LOCATIONS (I.E. - ALL INLETS).
	EFFECTIVE IRRIGATION SYSTEM	MONTHLY	WHEN BROKEN SPRINKLER HEADS, RAIN SHUTOFF DEVICES, AND FLOW REDUCERS ARE OBSERVED; OR RUNNING SPRINKLERS IN RAIN ARE OBSERVED	REPAIR OR REPLACE THE BROKEN AND/OR MALFUNCTIONING PARTS OF IRRIGATION SYSTEM.

BMP DESCRIPTION		POST-CONSTRUCTION PERMANENT BMP OPERATION & MAINTENANCE PROCEDURE DETAILS[1] O&M RESPONSIBLE PARTY DESIGNEE: PROPERTY OWNER INSPECTION FREQUENCY[2]	MAINTENANCE FREQUENCY	MAINTENANCE METHOD
STRUCTURAL BMPs	BIOFILTRATION BASINS (BMPS 1, 2, 3)	TWICE A YEAR AND AFTER MAJOR STORM EVENTS (NOTE: INSPECTOR SHALL CHECK FOR THE FOLLOWING MAINTENANCE INIDICATORS: EROSION IN THE FORM OF RILLS OR GULLIES, PONDING WATER, BARE AREAS, ANIMAL BURROWS, HOLES, MOUNDS, AND TRASH)	1. AS DETERMINED BY INSPECTION; AND 2. ON OR BEFORE SEPTEMBER 30TH AND FOLLOWING THE RAINY SEASON AFTER MAY 1ST.	1. REPLACE MULCH IN AREAS OF RUTS, RILLS, OR GULLIES; 2. RE-SEED AND/OR PLANT SLOPES AND AREAS OF EXPOSED SOILS; AND 3. ROUTINE MAINTENANCE TO REMOVE ACCUMULATED MATERIALS SUCH AS TRASH AND DEBRIS. 4. NON-ROUTINE MAINTENANCE WILL BE REQUIRED TO BACKWASH AND CLEAR UNDERDRAINS IF INSPECTION INDICATES UNDERDRAINS ARE CLOGGED. 5. DEPENDING ON POLLUTANT LOADS, SOILS MAY NEED TO BE REPLACED EVERY 5 TO 10 YEARS. 6. THE RISER STRUCTURE SHOULD BE MAINTAINED TO AVOID CLOGGING AND ANY LEAKAGE THROUGH BOLTHOLES. 7. TRIM VEGETATION AT THE BEGINNING AND END OF WET SEASON AND INSPECT MONTHLY TO PREVENT ESTABLISHMENT OF WOODY VEGETATION AND FOR AESTHETIC AND VECTOR REASONS

NOTE:

1. A SIGNIFICANT RAIN EVENT CONSIDERED WHENEVER THE NATIONAL WEATHER SERVICE REPORTS 0.50" OF RAIN IN 48 HOURS FOR THE LOCAL COMMUNITY

2. DURING THE FIRST YEAR OF NORMAL OPERATION, ALL BMPS SHOULD BE INSPECTED ONCE BEFORE AUGUST 31 AND THEN MONTHLY FROM SEPTEMBER THROUGH MAY. THE MINIMUM INSPECTION AND MAINTENANCE FREQUENCY SHOULD BE DETERMINED BASED ON THE RESULTS OF THE FIRST YEAR INSPECTIONS.

3. BASINS HAVE A MID FLOW ORIFICE DIAMETER: 1.125" & LOW FLOW ORIFICE DIAMETER: 0.625"

ATTACHMENT 4

County of San Diego PDP Structural BMP Verification for Permitted Land Development Projects

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County of San Diego PDP-IVF:

Installation Verification Form for Priority Development Projects (PDPs)

This form must be accepted by the County prior to the release of construction permits or granting of occupancy for applicable portions of a Priority Development Project (PDP). Applicants are responsible for providing all requested information. Do not leave any fields blank; indicate *N/A* for any requested item that is not applicable.

PART 1 General Project and Applicant Information

Table 1: Project and Applicant Information

A. Project Summary Information	**ID No. IVF-20__-____ To be assigned by DPW-WPP**
Project Name	Jamul Retail Center
Record ID (e.g., grading/improvement plan number, building permit)	TBD
Project Address	West Side of Jefferson Road
Assessor's Parcel Number(s) APN(s))	596-071-60
Project Watershed (complete Hydrologic Unit, Area, and Subarea Name with Numeric Identifier)	Hydrologic Unit: Sweetwater, 909.2 Subarea: Jamacha, 909.21
B. Owner Information	
Name	Woodside REV
Address	1410 Main Street, Suite C
Email Address	Ramona, California 92065
Phone Number	760-271-9400

Document previously verified BMPs for the PDP in **Table 2**. Include the Verification Form ID No. from **Page 1** if one was issued.

****** DO NOT INCLUDE THIS PAGE UNLESS THIS IS A PARTIAL RECORD PLAN VERIFICATION ******

Table 2: Information on Verifications for Partial Record Plans Only

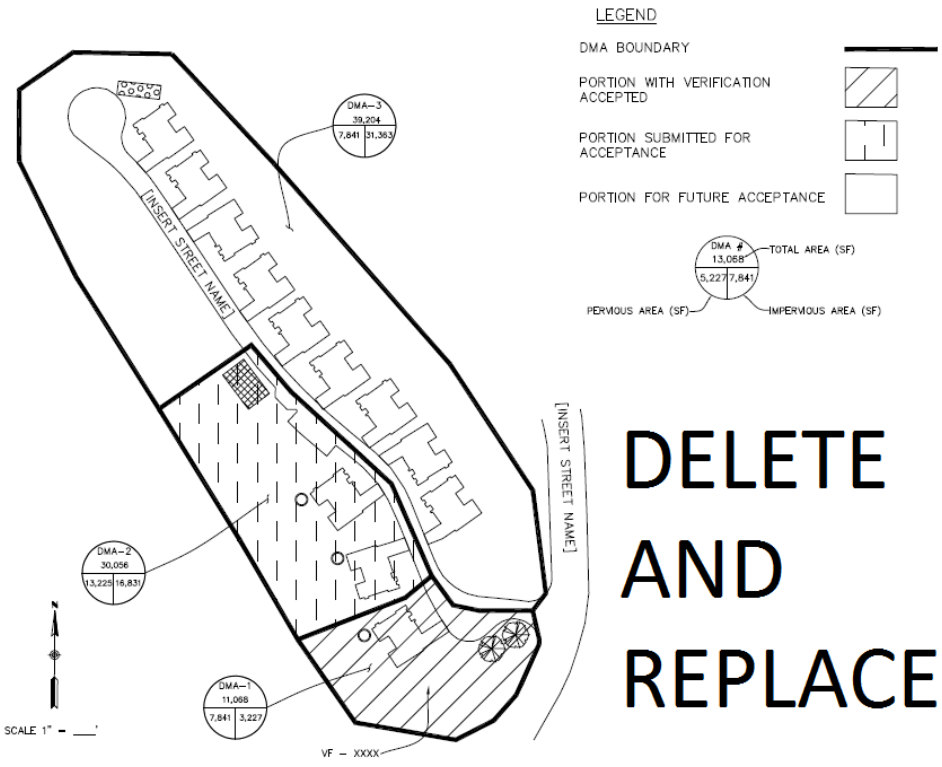
A: Previous Submittals

Previous Submittals	Submittal Date	Installation Verification Form ID No. if applicable (e.g., 2016-001)
1	Enter date.	Click here to enter text.
2	Enter date.	Click here to enter text.
3	Enter date.	Click here to enter text.
4	Enter date.	Click here to enter text.
5	Enter date.	Click here to enter text.
Add rows as needed		

B: DMA and BMP Map

Please attach a map showing (1) all DMAs for the project site, (2) the DMAs and/or lots accepted under previous Verification Forms, and (3) the locations of Structural BMPs and Significant Site Design BMPs previously accepted OR listed in **Table 3** of this Verification Form.

SAMPLE DMA MAP



PART 2 DMA and BMP Inventory Information

Use this table to document Structural BMPs (S-BMPs) and Significant Site Design BMPs (SSD-BMPs) for the PDP. All DMAs are required to have at least one Structural BMP or Significant Site Design BMP.

- In **Part A**, list all Structural BMPs (including both Pollutant Control and/or Hydromodification as applicable) by DMA.
- Complete **Part B** for all DMAs that contain only Significant Site Design BMPs. SSD-BMPs are Site Design BMPs credited in **Worksheet B-1.1** of the BMP Design Manual for Design Capture Volume (DCV) reductions. Only Tree Wells and Dispersion Areas should be included in this inventory.
- For any DMA that contains both S-BMPs and SD-BMPs, document only the S-BMPs; you do not need to include the SD-BMPs.
- The information provided for each BMP in the table must match that provided in the Stormwater Quality Management Plan (SWQMP), construction plans, maintenance agreements, and other relevant project documentation.

Table 3: Required Information for Structural BMPs and Significant Site Design BMPs

DMA #	BMP Information			Maintenance Category	Maintenance Agreement or Maintenance Notification Recorded Doc. #	Construction Plan Sheet #	Landscape Plan # & Sheet # (For Vegetated BMPs Only)	FOR DPW-WPP USE ONLY *Reviewer concurs that the BMP(s) may be accepted into inventory (date and initial)*
	Quantity	Description/Type of Structural BMP	BMP ID #(s)					
Part A Structural BMPs								
DMA-1	1	Biofiltration Basin (BF-1)	BMP-1	2	TBD	TBD	TBD	
DMA-2	1	Biofiltration Basin (BF-1)	BMP-2	2	TBD	TBD	TBD	
DMA-3	1	Biofiltration Basin (BF-1)	BMP-3	2	TBD	TBD	TBD	
Add rows as needed								
Part B Significant Site Design BMPs								
		Choose an item.						
		Choose an item.						
		Choose an item.						
Add rows as needed								

PART 3 Required Attachments for All BMPs Listed in Table 3

For ALL projects, submit the following to the County inspector (check all that are attached):

☐ Photographs: A photograph of each fully constructed S-BMP or SSD-BMP (or group of BMPs).

☐ Maintenance Agreements: Copies of all approved and recorded Storm Water Maintenance Agreements (SWMAs) or Maintenance Notifications (MNs) for all S-BMPs.

Note: All BMPs proposed for County ownership will remain the responsibility of the owner listed on **Page 1** until a signed Letter of Acceptance of Completion is received by the DPW Watershed Protection Program.

For Grading and Improvement projects only, ALSO submit:

☐ Landscape Plans: An 11" X 17" copy of the most current applicable Landscape Plan sheets where the BMPs are required to be vegetated, including:

- ☐ The Certification of Completion (Form 407), AND
- ☐ The Certificate of Approval from PDS Landscape Architect

Note: For each Landscape Plan, the sheets submitted must show the location of each verified as-built BMP.

☐ Construction Plans: An 11" X 17" copy of the most current applicable approved Construction Plan sheets:

- ☐ Grading Plans, AND/OR
- ☐ Improvement Plans, AND/OR
- ☐ Precise Grading Plan(s) (only for residential subdivisions with tract homes), AND/OR
- ☐ Other (Please specify) Click here to enter text.

Note: For each Construction Plan, the sheets submitted must incorporate all of the following:

- ☐ A BMP Table, AND
- ☐ A plan/cross-section of each verified as-built BMP, AND
- ☐ The location of each verified as-built BMP

Required only for Verifications for Partial Record Plans

☐ If this is a partial record plan verification, please include the following:

- ☐ A list of previously submitted Verification Forms (**Table 2, part A**)
- ☐ A map of DMAs and BMPs (**Table 2, part B**)

PART 4 Engineer of Work Certification

By signing below, I certify that the BMP(s) listed in Table 3 of this Verification Form have been constructed and all are in substantial conformance with the approved plans and applicable regulations. I understand the County reserves the right to inspect the above BMPs to verify compliance with the approved plans and Watershed Protection Ordinance (WPO). Should it be determined that the BMPs were not constructed to plan or code, corrective actions may be necessary before permits can be closed.

Please sign and provide your seal below.

[SEAL]

Professional Engineer's Printed Name:

Click here to enter text.

Email: Click here to enter text.

Phone Number: Click here to enter text.

Professional Engineer's Signed Name:

_____

Date: Click here to enter text.

COUNTY - OFFICIAL USE ONLY:

For County Inspectors

County Department: _____

Date verification received from EOW: _____

By signing below, County Inspector concurs that every noted BMP has been installed per plan.

Inspector Name: _____

Inspector's Signature: _____ Date: _____

For Building Division Only

Inspection Supervisor Name: _____

Inspector Supervisor's Signature: _____ Date: _____

PDCI & Building, along with the rest of this package, please provide to DPW WPP:

☐ A copy of the final accepted SWQMP and any accepted addendum

For Watershed Protection Program Only

Date Received: _____

WPP Submittal Reviewer: _____

WPP Reviewer concurs that the BMPs accepted in **Part 2** above may be entered into inventory.

WPP Reviewer's Signature: _____ Date: _____

ATTACHMENT 5

Copy of Plan Sheets Showing Permanent Storm Water BMPs, Source Control, and Site Design

This is the cover sheet for Attachment 5.

Use this checklist to ensure the required information has been included on the plans:

The plans must identify:

☒ Structural BMP(s) with ID numbers matching Step 6 Summary of PDP Structural BMPs
☒ The grading and drainage design shown on the plans must be consistent with the delineation of DMAs shown on the DMA exhibit
☒ Details and specifications for construction of structural BMP(s)
☒ Signage indicating the location and boundary of structural BMP(s) as required by County staff
☐ How to access the structural BMP(s) to inspect and perform maintenance
☐ Features that are provided to facilitate inspection (e.g., observation ports, cleanouts, silt posts, or other features that allow the inspector to view necessary components of the structural BMP and compare to maintenance thresholds)
☒ Manufacturer and part number for proprietary parts of structural BMP(s) when applicable
☐ Maintenance thresholds specific to the structural BMP(s), with a location-specific frame of reference (e.g., level of accumulated materials that triggers removal of the materials, to be identified based on viewing marks on silt posts or measured with a survey rod with respect to a fixed benchmark within the BMP)
☐ Recommended equipment to perform maintenance
☐ When applicable, necessary special training or certification requirements for inspection and maintenance personnel such as confined space entry or hazardous waste management
☐ Include landscaping plan sheets showing vegetation requirements for vegetated structural BMP(s)
☒ All BMPs must be fully dimensioned on the plans
☐ When proprietary BMPs are used, site-specific cross section with outflow, inflow, and model number must be provided. Photocopies of general brochures are not acceptable.
☐ Include all source control and site design measures described in Steps 4 and 5 of the SWQMP. Can be included as a separate exhibit as necessary.

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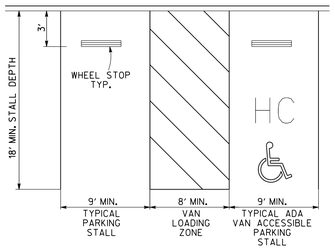
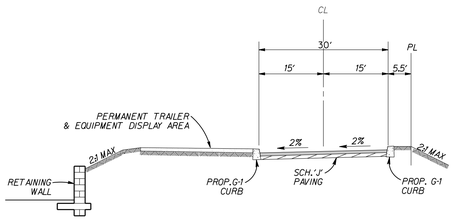


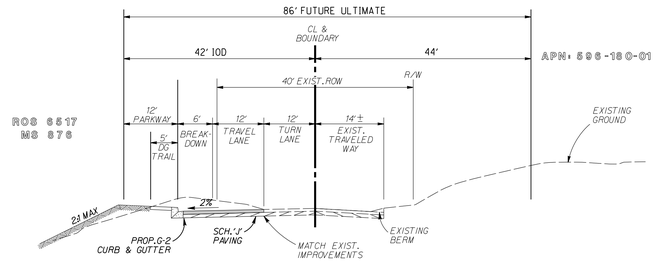
TYPICAL PARKING STALL(S)

NOT TO SCALE



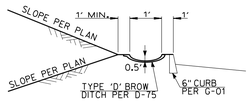
STREET SECTION: TRACTOR SUPPLY DRIVEWAY

NOT TO SCALE



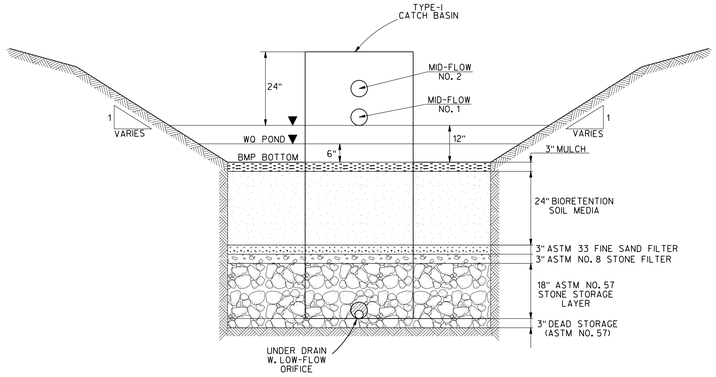
STREET SECTION A-A: JEFFERSON ROAD

NOT TO SCALE



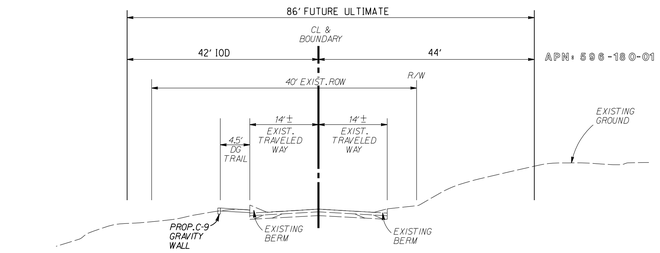
MODIFIED TYPE D BROW DITCH

NOT TO SCALE



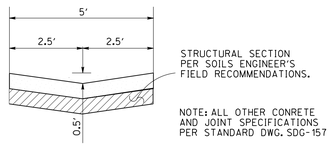
TYPICAL BMP CROSS SECTION

NOT TO SCALE



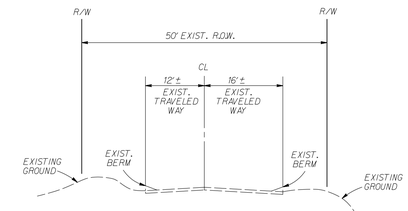
EXIST. STREET SECTION B-B: JEFFERSON ROAD

NOT TO SCALE



RIBBON GUTTER

NO SCALE



EXIST. STREET SECTION C-C: OLIVE VISTA DRIVE

NOT TO SCALE

RICK ENGINEERING COMPANY
San Diego
5620 FRIARS ROAD
SAN DIEGO, CA 92110
619-291-0707
(FAX) 619-291-4165
rickengineering.com
Riverside - Orange - Sacramento - San Luis Obispo - Phoenix - Tucson - Denver

J-18145

Prepared By:
Name: Rick Engineering Company
Address: 5620 Friars Road
San Diego, California 92110
Phone #: (619) 291-0707

Project Address:
WEST SIDE JEFFERSON ROAD
EAST OF LYONS VALLEY ROAD, SOUTH OF
OLIVE VISTA DR, NORTH OF CAMPO ROAD
JAMUL, COUNTY OF SAN DIEGO, CALIFORNIA

Project Name:
JAMUL RETAIL CENTER

Sheet Title:
PRELIMINARY GRADING PLAN

Revision 14:
Revision 13:
Revision 12:
Revision 11:
Revision 10:
Revision 9:
Revision 8:
Revision 7:
Revision 6:
Revision 5:
Revision 4:
Revision 3:
Revision 2:
Revision 1:

Original Date: 04/09/2018

Sheet 2 of 6

COUNTY OF SAN DIEGO
TRACT NO. TPM 21262

PRELIMINARY
NOT FOR CONSTRUCTION

ATTACHMENT 6

Copy of Project's Drainage Report

This is the cover sheet for Attachment 6.

If hardcopy or CD is not attached, the following information should be provided:

Title: Drainage Study for Jamul Retail Center
Prepared By: Rick Engineering Company (J-18145)
Date: 7/10/2018

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DRAINAGE STUDY
FOR
JAMUL RETAIL CENTER

(PRELIMINARY ENGINEERING)

County of San Diego Record ID:
PDS2018-MUP-18-008 & PDS2018-TPM-21262

Job Number 18145

March 26, 2018
Revised: July 10, 2018
Revised: October 10, 2018

RICK
ENGINEERING COMPANY

DRAINAGE STUDY
FOR
JAMUL RETAIL CENTER

(PRELIMINARY ENGINEERING)

County of San Diego Record ID:
PDS2018-MUP-18-008 & PDS2018-TPM-21262

Job Number 18145

Brendan Hastie
R.C.E #65809, Exp. 9/19

Prepared For:

Woodside REV
1410 Main Street, Suite C
Ramona, California 92065
(760) 271-9400

Prepared By:

Rick Engineering Company
Water Resources Division
5620 Friars Road
San Diego, California 92110-2596
(619) 291-0707

March 26, 2018
Revised: July 10, 2018
Revised: October 10, 2018

TABLE OF CONTENTS

Figures:

Tables:

Appendices:

Map Pockets:

DECLARATION OF RESPONSIBLE CHARGE

I hereby declare that I am the Engineer of Work for this Project, that I have exercised responsible charge over the design of the project as defined in Section 6703 of the Business and Professions Code, and that the design is consistent with current standards.

I understand that that check of project drawings and specification by the County of San Diego is confined to a review only and does not relieve me, as engineer of work, of my responsibilities for project design.

Brendan Hastie, R.C.E #65809, Exp. 9/19

10/9/18
Date

DRAINAGE STUDY
FOR
JAMUL RETAIL CENTER

REVISION PAGE
October 10, 2018

Pursuant to the Comments provided by the County of San Diego received September 11, 2018, this letter presents a revision to the report titled, "Drainage Study for Jamul Retail Center (Preliminary Engineering)" dated July 10, 2018, prepared by Rick Engineering Company. The following text identifies the review comments in italics, followed by Rick Engineering Company's response in bold.

5-4: In the narrative of the report please provide a summary table of: pre- and post-development C, Tc, I, A, V100, Q100 without mitigation and Q100 with mitigation for each area (or point) where drainage discharges from the project. Peak runoff rates (cfs), velocities (fps) and identification of all erosive velocities (at all points of discharge) calculations for pre-development and post-development.

The comparisons should be made about the same discharge points for each drainage basin affecting the site and adjacent properties.

Based on the analysis, it seems like the project may cause minor diversion of flow; node 160 in existing conditions receives drainage from .8 acres but in proposed conditions this area increases to about 1.7 acres.
Provide comparison of flows at both nodes 150 and 160 to show no impacts is caused by the development.

8/28/2018 Update:
The project is showing diversion of the flow and an increase of runoff by 15 cfs at POI1. Please provide supporting calculation showing that there is no impacts downstream of the two POI at a ultimate point of discharge.

In the existing condition, there is no contributing area to POI 1 (node 150) from the project site, and there is 9.9 acres of contributing area to POI 2 (node 160). In order to minimize the impacts to the Biological Open Space and to mitigate existing adverse drainage conditions on the adjacent mobile home community, the outfall for the project is located at post-project node 150 (POI 1); therefore, there is a decrease in total area contributing to Node 160 in the post-project condition. Please refer to Tables 1, 2, and 3 for Hydrologic results for the pre-project, post-project (un-detained), and post-project (detained), respectively. Stormwater conveyed into POI 1 from the site is being detained from 47.3 cfs to 15.1 cfs to minimize the potential

for erosion and flooding. The outfall will include a rip-rap that will be designed during final engineering. Tables 1, 2, and 3 have been updated to include additional information as requested and narrative in Section 2.3 has been added to clarify the drainage conditions.

5-6: Revise Table 2 and the conclusion section of the report based on comments provided above.

8/28/2018 Update:
Revise Table 2 and the conclusion section of the report based on comment 5-4 above.

Tables 1, 2, and 3 and the conclusion have been updated based on Comment 5-4. Refer to response to 5-4 for additional information.

5-8: Discuss whether or not the proposed project would substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, or substantially increase the rate or amount of surface runoff in a manner which would result in flooding on- or off-site? Provide reasons and mitigations proposed.

8/28/2018 Update:
Revise based on comment 5-4 above. Clearly discuss how there is no impacts from the increase of runoff at POI 1.

Narrative has been added to Section 2.3 the Detention Section (Section 3), and the Conclusion to better explain the drainage patterns and detention. It should be noted that the total runoff from the site has been decreased in the post-project condition when compared to the existing condition. Refer to the response to Comment 5-4 for additional information.

5-13: New Comment: Clarify how the runoff from the street is routed to the proposed BMP's. See comment 4-6 above for more clarification.

Runoff from Jefferson Road is conveyed into the proposed inlets on the west half of Jefferson Road via street flow and curb and gutter. Stormwater is then conveyed into the proposed BMPs through the proposed on-site storm drain. Please refer to the TM Plans, specifically Jefferson Rd Cross Sections A-A and B-B for typical roadway cross sections. Additionally, refer to the Post-Project Drainage Exhibit located in Map Pocket 2 for drainage patterns, proposed storm drain, and BMP locations.

DRAINAGE STUDY
FOR
JAMUL RETAIL CENTER

REVISION PAGE

July 10, 2018

Pursuant to the Comments provided by the County of San Diego received June 15, 2018, this letter presents a revision to the report titled, "Drainage Study for Jamul Retail Center (Preliminary Engineering)" dated March 26, 2018, prepared by Rick Engineering Company. The following text identifies the review comments in italics, followed by Rick Engineering Company's response in bold.

1. *Provide DECLARATION OF RESPONSIBLE CHARGE – see San Diego County Hydrology Manual, Figure 1-9.*

   Declaration of Responsible Charge has been provided in as requested.

2. *The final CEQA Drainage report shall be signed, stamped and dated by the responsible California Registered Civil Engineer.*

   The final CEQA Drainage report has been signed, stamped and dated appropriately.

3. *Include the project number on the title sheet.*

   The project number has been added to the title sheet.

4. *In the narrative of the report please provide a summary table of: pre- and post-development C, Tc, I, A, V_{100}, $Q_{100\ without\ mitigation}$ and $Q_{100\ with\ mitigation}$ for each area (or point) where drainage discharges from the project. Peak runoff rates (cfs), velocities (fps) and identification of all erosive velocities (at all points of discharge) calculations for pre-development and post-development.*

   The comparisons should be made about the same discharge points for each drainage basin affecting the site and adjacent properties.

   Based on the analysis, it seems like the project may cause minor diversion of flow; node 160 in existing conditions receives drainage from .8 acres but in proposed conditions this area increases to about 1.7 acres.

Provide comparison of flows at both nodes 150 and 160 to show no impacts is caused by the development.

The results and summary tables in Section 2.3 have been updated to show the comparison at each Point of Interest (POI) and where drainage discharges from the project. Rainfall intensity (I) and additional information for each node and sub-area can be found in the AES analysis in Appendix A. Node 160 now referenced as POI 2, receives storm water runoff from 9.9 acres in the pre-project condition and decreases to 1.2 acres in the post-project condition (from landscaped slopes).

5. *Existing and Proposed Hydrology Maps:*
   **The limits of overall DMA between existing and proposed conditions should be the same and should include the entire project site. Currently the existing exhibit shows the entire 9.8 acres; while the proposed exhibit is only addressing the areas tributary to node 150.*

   Clearly show how the runoff in node 160 is impacted from the proposed development. As mentioned in the previous comment, the project is causing a minor diversion of flow. Clearly show how the runoff is impacted at each POC as a result of development.

   **Show discharge point with A & Q information for each node and discharge of sub-basins on the existing and proposed drainage exhibits.*

   The hydrologic maps have been updated to show the same major watershed boundary for the project site. Two Points of Interest (POIs) (discharge points from the site) showing peak flow rate, time of concentration, and watershed areas, have been added to clearly show the impacts between the pre- and post- project conditions. Peak flow rates for individual sub-basins can be found in the AES analysis in Appendix A.

6. *Revise Table 2 and the conclusion section of the report based on comments provided above.*

   Table 2 has been modified to reflect the latest site plan and calculations. Additionally, refer to responses for comments 4 and 5 for more information regarding changes to maps and calculations.

7. *Summary/Conclusion:*
   Please discuss whether or not the proposed project would substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, in a manner which would result in substantial erosion or siltation on- or off-site? Provide reasons and mitigations proposed.

   The proposed project is not anticipated to alter the existing drainage pattern in a manner which would result in substantial erosion or siltation on- or off-site. Additional discussion has been added to Section 5.0.

8. *Discuss whether or not the proposed project would substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, or substantially increase the rate or amount of surface runoff in a manner which would result in flooding on- or off-site? Provide reasons and mitigations proposed.*

   The proposed project is not anticipated to alter the existing drainage pattern in a manner which would result in flooding on- or off-site. Additional discussion has been added to Section 5.0.

9. *Discuss whether or not the proposed project would create or contribute runoff water which would exceed the capacity of existing or planned storm water drainage systems? Provide reasons and mitigations proposed.*

   The proposed project is not expected to create or contribute runoff water which would exceed the capacity of existing or planned storm water drainage systems. Additional discussion has been added to Section 5.0.

10. *Discuss whether or not the proposed project would place housing within a 100-year flood hazard area as mapped on a federal Flood Hazard Boundary or Flood Insurance Rate Map or other flood hazard delineation map, including County Floodplain Maps? Provide reasons and mitigations proposed.*

    The proposed project is not anticipated to place housing within a 100-year flood hazard area. The FEMA FIRM provided in Appendix D shows that the project is located in a Zone X, which is an area of minimal flooding. Additional discussion has been added to Section 5.0.

11. *Discuss whether or not the proposed project would place structures within a 100-year flood hazard area which would impede or redirect flood flows?*

    The proposed project is not anticipated to place structures within a 100-year flood hazard area. Additional discussion has been added to Section 5.0.

12. *Discuss whether or not the proposed project would expose people or structures to a significant risk of loss, injury or death involving flooding as a result of the failure of a levee or dam?*

    No levees or dams are located within the vicinity of the project site. Therefore, the proposed project is not anticipated to expose people or structures to a significant risk of loss, injury or death involving flooding as a result of the failure of a levee or dam. Additional discussion has been added to Section 5.0.

1.0 INTRODUCTION

This drainage report supports preliminary design of the Jamul Retail Center project (herein referred to as the Project). The project site is located along the western side of Jefferson Road between Olive Vista Drive and Campo Road, within the County of San Diego. The project is located approximately 200 feet east of Steele Canyon Creek. The vicinity map is shown in Figure 1, located at the end of this section.

The project proposes to develop the site into a tractor supply and self-storage center. The project will also improve and widen the west side of Jefferson Road for the length adjacent to the project site. The area within the project footprint is approximately 9.9 acres, and the parcel area is approximately 19.4 acres.

1.1 Existing Drainage Characteristics

The Project in its existing condition is comprised of a moderately steep, undeveloped hillside with dirt trails and scattered vegetation, as well as the west side of Jefferson Road. Runoff consists of unconcentrated drainage across the undeveloped hillside that flows through an existing mobile home community downstream and adjacent to the project site. There is no existing drainage system that conveys this unconcentrated flow from the project site around the mobile home community; therefore, much of this storm water runoff is conveyed through the yards or various localized ditches. Drainage along Jefferson Road is conveyed northerly along an existing asphalt dike that enters a natural unnamed channel and ultimately confluences with Steele Canyon Creek.

A large, mostly undeveloped off-site area east of the project drains westerly onto Jefferson Road as well as under the road through two 24-inch corrugated metal pipe (CMP) culverts into the natural unnamed tributary channel north of the project site. The portion of this off-site area that drains onto Jefferson Road is conveyed northerly through a natural eroded channel adjacent to the road as well as the asphalt dike before entering the unnamed channel, bypassing the project site.

Refer to the Existing Condition Drainage Study Map located in Map Pocket 1 for more information.

1.2 Proposed Drainage Characteristics

In the proposed condition the Project will develop the site into two lots; the southern lot associated with the tractor supply center, and the northern lot associated with the self-storage center. These two lots contain approximately 5.5 acres of impervious surface along with 0.7 acres associated with the Jefferson Road widening and improvements. The remaining 3.7 acres of the project site will be various landscape features, including fill slopes and areas reserved for three biofiltration basins. Each lot will have a localized storm drain system consisting of ribbon gutters, catch basins, and curb inlets.

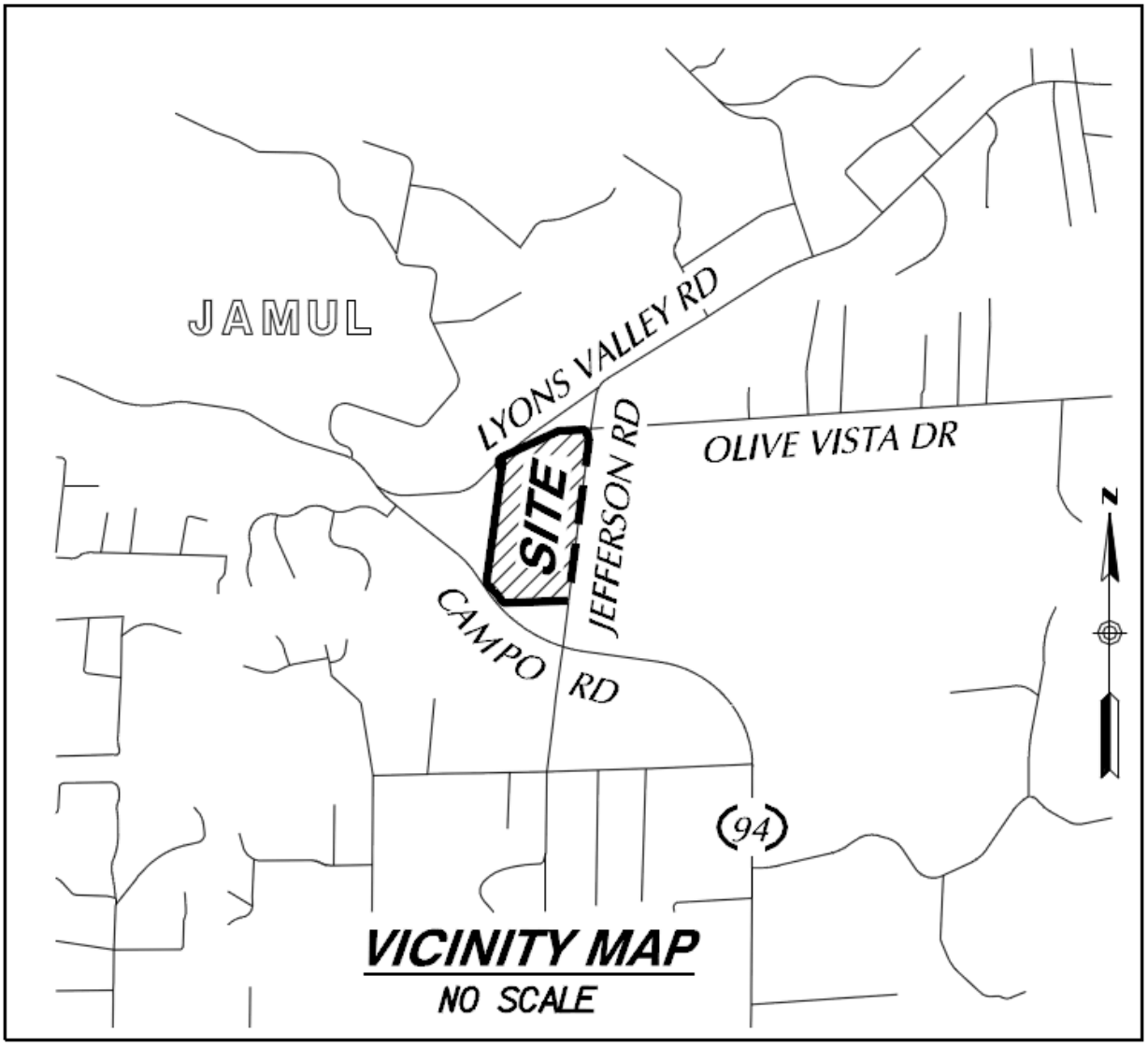
The drainage from Jefferson road will be split between the two lots and will enter the storm drain system through three curb inlets with each curb inlet ultimately leading to a separate biofiltration basin. Two of the three biofiltration basins will capture runoff from the southern lot as well as approximately 400 linear feet of the west side of Jefferson road. The third biofiltration basin will capture runoff from the northern lot and approximately 400 linear feet of Jefferson Road. Runoff from approximately 0.7 acres of landscaped area within the project site will be conveyed via brow ditch directly into the storm drain system, bypassing the biofiltration basins.

Storm drains conveying drainage from each lot and adjacent portion of Jefferson Road will confluence within the northern lot before leading to the single proposed outfall along the natural unnamed channel located north of the project site. The outfall is located in an area that directs flows away from the mobile home community. Pursuant to coordination with the project's environmental consultant, the current proposed storm drain layout would result in the least impact to riparian zones and existing trees/vegetation.

Off-site drainage that is conveyed along the east side of Jefferson Road will continue to be conveyed into the natural unnamed channel prior to the two 24-inch CMP culverts and is not included in the analyses.

Refer to Section 2.3 and the Proposed Condition Drainage Study Map within Map Pocket 2 for more information.

Figure 1 Vicinity Map



2.0 HYDROLOGY

2.1 Criteria

The hydrologic conditions were analyzed in accordance with the County of San Diego's design criteria.

Design Storm:	100-year, 6-hour
100-Year 6-Hour Precip (inches):	P = 3.3 inches

June 2003 San Diego County *Hydrology Manual* Criteria (unit-less)

Soil Type: C (See Appendix A.3)

Intensity-Duration-Frequency (I-D-F) Curves within the June 2003 County of San Diego *Hydrology Manual* (inches per hour)

2.2 Modified Rational Method

To calculate the flow rates for Basin 100 in pre-project and post-project condition, a Modified Rational Method analysis was performed in accordance with the methodology presented in the June 2003 County of San Diego *Hydrology Manual* to determine pre- and post-project 100-year peak discharge rates for watersheds less than 1 square-mile. The Advanced Engineering Software (AES) Rational Method computer program was used to perform these calculations. The hydrologic model is developed by creating independent node-link models of each interior drainage basin and linking these sub-models together at confluence points. The program has the capability to perform calculations for 15 hydrologic processes. These processes are assigned code numbers that appear in the results. The code numbers and their significance are as follows:

Code 1: Confluence analysis at a node
Code 2: Initial subarea analysis
Code 3: Pipe flow travel time (computer-estimated pipe sizes)
Code 4: Pipe flow travel time (user-specified pipe size)
Code 5: Trapezoidal channel travel time
Code 6: Street flow analysis through a subarea
Code 7: User-specified information at a node
Code 8: Addition of the subarea runoff to mainline
Code 9: V-Gutter flow thru subarea
Code 10: Copy main-stream data onto a memory bank
Code 11: Confluence a memory bank with the main-stream memory
Code 12: Clear a memory bank
Code 13: Clear the main-stream memory
Code 14: Copy a memory bank onto the main-stream memory
Code 15: Hydrologic data bank storage functions

In order for the program to perform the hydrologic analysis; base information for the study area is required. This information includes the land uses, drainage facility locations, flow patterns, drainage basin boundaries, and topographic elevations. The rainfall data, runoff coefficients, and soils information were obtained from the June 2003, County of San Diego *Hydrology Manual*.

2.3 Hydrologic Results

In the pre-project condition, the entire project site drains to the west toward the mobile home community and is represented by a single Point of Interest (POI), referred to as POI 2. In the post-project condition, the majority of the stormwater generated from the site will be directed to a single outfall being proposed along the natural unnamed channel located north of the project site at POI 1 (Node 150). As a result, the total area tributary to POI 2 has decreased from 9.9 acres to 1.2 acres. Stormwater that is tributary to POI 2 will continue to sheet flow from the site similar to existing conditions; however, the tributary area and peak flow rate have decreased. The 100-year peak discharge rate at POI 2 (Node 160) has decreased from 19.4 cfs in the pre-project condition to 3.1 cfs in the post-project condition.

POI 1 (approximately 550 feet upstream of the existing condition confluence with Steele Canyon Creek (POI 3)) was selected as the project's outfall through coordination with the project's biologist in order to minimize the impacts to riparian areas and biological open space and also to mitigate flooding issues that the mobile home community currently experiences. The total area tributary to POI 1 has increased from 0.0 acres in the pre-project condition to 8.7 acres. A summary of the pre- and post-project hydrologic results are provided below in Tables 1, 2, and 3.

Table 1 – Hydrologic Summary Table (Pre-project)

POI[1]/Drainage Node	Watershed Area (acres)	Runoff Coefficient	Time of Concentration (min)	100-Year Peak Flow Rate (cfs)	100-Year Peak Flow Velocity (fps)
POI 1/150	0.0	N/A	N/A	0.0	0.0
POI 2/160	9.9	0.32	8.8	19.4	Sheet Flow
POI 3 (Total Site)	9.9	0.32	8.8	19.4	Sheet Flow

Table 2 – Hydrologic Summary Table (Post-project, Un-detained)

POI[1]/Drainage Node	Watershed Area (acres)	Runoff Coefficient	Time of Concentration (min)	Un-detained 100-Year Peak Flow Rate (cfs)
106 (BMP2)	2.4	0.83	5.7	15.9
126 (BMP1)	1.3	0.68	5.9	6.9
146 (BMP3)	3.5	0.89	6.0	24.2
POI 1/150[a]	8.7	0.74	6.9	47.3
POI 2/160	1.2	0.30	4.6	3.1
POI 3 (Total Site)	9.9	0.69	6.9	49.7

a. POI 1 includes areas from nodes 106, 126, and 146.

It can be observed that there is an increase in the peak discharge rate for the site as a whole at POI 3 due to the increase in imperviousness and decrease in time of concentration. However, detention is being provided within the proposed BMPs to route the un-detained post-project peak flow rate back to pre-project conditions for the site as a whole. The 100-year modified rational method calculations for pre- and post-project conditions are provided in Appendix A1 through A3, while the associated hydrologic drainage exhibits are located in Map Pockets 1 and 2.

3.0 DETENTION

Detention is provided within BMPs-1, 2 & 3 to route the un-detained 100-year peak discharge for Basin 100 back to pre-project conditions for the site as a whole. As mentioned in section 2.3, POI 1 was selected as the project's outfall through coordination with the project's biologist in order to minimize the impacts to riparian areas and biological open space and also to mitigate existing adverse drainage conditions that the mobile home community currently experiences. In order to mitigate the potential for flooding downstream of Steele Canyon Creek (POI 3), the peak discharge from the site is being detained within the proposed BMPs. The detention analysis utilizes the AES Modified Rational Method hydrologic analysis for the post-project (un-detained) condition that is tributary to each proposed BMP (Nodes 106, 126, and 146). To determine the pre-project 100-year peak flow rate that each BMP must detain to, the pre-project 100-year peak flow rate was prorated based on a fraction of tributary acreage to each BMP to the total tributary acreage of Basin 100.

The sizing of a detention facility requires an inflow hydrograph to obtain the necessary storage volume. The modified rational method only yields a peak discharge and time of concentration, and does not yield a hydrograph. In order to convert the peak discharge and time of concentration into a hydrograph, a modified rational method hydrograph synthesizing procedure was used. The modified rational method hydrograph synthesizing procedure methodology and criteria that were used are based on the Rational Method Hydrograph Procedure and Detention Basin Design, of the *San Diego County Hydrology Manual 2003*.

The 100-year hydrographs and preliminary elevation-storage-outflow rating curves were used in the HEC-1 hydrologic model to perform routing calculations for the detention basin, and to determine the preliminary 100-year detention volumes required for the basin to reduce the post-project peak discharge rate back to the prorated pre-project peak discharge rate. Actual storage and rating curves will be provided during final engineering along with detailed outlet-works designs for each BMP. Table 3 below provides a summary of the detention analysis.

Table 3 – Hydrologic Summary Table (Post-project, Detained)

BMP or POI[1] ID/ Drainage Node	Watershed Area (acres)	Runoff Coefficient	Lag Time (min)	Time of Concentration[4] (min)	Detained 100-Year Peak Flow Rate (cfs)	100-Year Peak Flow Velocity[5] (fps)
BMP 1 / 146[2]	3.5	0.89	4.8	10.8	7.3	3.7
BMP 2 / 106[2]	2.4	0.83	4.8	10.5	4.7	3.2
BMP 3 / 126[2]	1.3	0.68	4.8	10.7	2.4	3.2
POI 1 / 150[2]	8.7	0.74	N/A	12.9	15.1	5.9
POI 2 / 160[3]	1.2	0.30	N/A	4.6	3.1	N/A
POI 3 (Total Site)	9.9	.69	N/A	12.9	16.7	N/A

([1]): POI is the Point of Interest for the project
([2]): Flow Rate calculated using the Modified Rational Method
([3]): Refers to fill slope (landscaped) acreage on west perimeter of project that does not convey drainage into the proposed storm drain system tributary to POI 1.
([4]): Time of Concentration includes lag time for detained conditions
([5]): Velocities determined using normal depth calculations, see Appendix B

Based on the HEC-1 hydraulic model, the required detention volume for BMP-1, 2, & 3 is approximately 0.30, 0.18 & 0.07 acre-feet, respectively for the 100-year storm event. Refer to Appendix C for a schematic of the proposed basins, calculation back-up and results from the HEC-1 detention analyses. It should be noted that the peak discharge rate from the entire site at POI 3with detention (16.7 cfs from Table 3) is less than the pre-project peak discharge rate (19.4 cfs from Table 1).

4.0 HYDRAULICS

4.1 Hydraulic Methodology and Criteria

The 100-year post-project peak flow rates determined using the Modified Rational Method were used to preliminarily size the on-site storm drain system. Additional hydraulic analyses such as open channel sizing for brow ditches, proposed inlet sizing, dry lane calculations, and energy dissipaters will be prepared during final engineering pursuant to the San Diego County Hydrology Manual (June 2003).

4.2 Storm Drain Sizing

Proposed storm drain pipes were designed using normal depth calculations (storm drain sizing spreadsheet or Federal Highway Administration's Hydraulic Toolbox (v.4.2)). The anticipated 100-year flow rate to each storm drain pipe was estimated with AES Modified Rational Method. The anticipated 100-year flow rate with a 30% bump-up factor was used in calculations to provide recommended storm drain sizes. The 30% bump-up helps account for hydraulic losses within the system. A preliminary (general) storm drain sizing table was created to size proposed storm drain pipes.

The preliminary storm drain sizing table and the estimate velocities at each pipe outlet are provided in Appendix B of this report.

5.0 SUMMARY/CONCLUSION

This Drainage Study presents the hydrologic and hydraulic analyses for the Jamul Retail Center. The pre-project and post-project condition peak discharge rates were determined using the Modified Rational Method based on the hydrologic methodology and criteria described in the *San Diego County Hydrology Manual 2003.*

Preliminary storm drain sizes have been determined based on the 100-year peak flow rates. Preliminary detention sizing is provided for the 100-year, 6-hour storm event so that post-project peak discharge rates are routed back to pre-project conditions using the HEC-1 hydrologic model.

Post-project flows will be treated per the County of San Diego's BMP Design Manual, dated February 2016. For more information on water quality and HMP sizing, please refer to the a separate report titled, "Priority Development Project Storm Water Quality Management Plan (PDP SWQMP) for Jamul Retail Center," dated October 10, 2018 and prepared by Rick Engineering Company (Job No. 18145).

The proposed project will safely direct drainage away from the mobile home community and to the natural, unnamed channel located north of the project site (POI 1), and ultimately confluence with Steele Canyon Creek (POI 3). As a result, the amount of drainage that sheet flows directly to the mobile home community is significantly reduced (at POI 2). Therefore, it is not anticipated that there will be adverse impacts on existing or planned storm water drainage systems as a result of the project. The proposed project is not expected to alter the existing drainage pattern in a manner which would result in flooding on- or off-site.

The proposed outfall to the north will be protected with rip rap, and concentrated flows from the storm drain will be dissipated such that velocities leaving the rip rap pad will be non-erosive to the natural channel. The proposed project is not anticipated to alter the existing drainage pattern in a manner which would result in substantial erosion or siltation on- or off-site. Additionally, the proposed project is not anticipated to place housing or structures within a 100-year flood hazard area. The FEMA FIRM provided in Appendix D shows that the project is located in a Zone X, which is an area of minimal flooding.

No levees or dams are located within the vicinity of the project site. Therefore, the proposed project is not anticipated to expose people or structures to a significant risk of loss, injury or death involving flooding as a result of the failure of a levee or dam.

APPENDIX A

Hydrology

APPENDIX A1

Existing Condition AES Output

[100-Year]

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**************************************************************************

            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
            Reference: SAN DIEGO COUNTY FLOOD CONTROL DISTRICT
                         2003,1985,1981 HYDROLOGY MANUAL
          (c) Copyright 1982-2014 Advanced Engineering Software (aes)
              Ver. 21.0 Release Date: 06/01/2014  License ID 1261

                              Analysis prepared by:

                             Rick Engineering Company
                             1160 Marsh St. Suite 150
                            San Luis Obispo, CA 93401


 ************************** DESCRIPTION OF STUDY **************************
* JAMUL RETAIL CENTER, J-18145                                            *
* 100-YR, 6-HR EXISTING CONDITION FOR BASIN 100                           *
* J:\18145\WATERRESOURCES\HYDROLOGY\RATIONALMETHOD\..                     *
 **************************************************************************

  FILE NAME: JR100E1H.RAT
  TIME/DATE OF STUDY: 10:37 07/06/2018
--------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
--------------------------------------------------------------------------
  2003 SAN DIEGO MANUAL CRITERIA

  USER SPECIFIED STORM EVENT(YEAR) = 100.00
  6-HOUR DURATION PRECIPITATION (INCHES) =   3.300
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.95
  SAN DIEGO HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD
  NOTE: USE MODIFIED RATIONAL METHOD PROCEDURES FOR CONFLUENCE ANALYSIS
  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  ========  ================  ======  ===== ====== ===== =======
  1   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0313 0.167 0.0150

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  0.50 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint =  6.0 (FT*FT/S)
  *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
   OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*

**************************************************************************
  FLOW PROCESS FROM NODE    100.00 TO NODE    102.00 IS CODE =  21
--------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
==========================================================================
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .4100
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  UPSTREAM ELEVATION(FEET) =    997.00
  DOWNSTREAM ELEVATION(FEET) =    989.00
  ELEVATION DIFFERENCE(FEET) =      8.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    6.210
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.560
```

```
  SUBAREA RUNOFF(CFS) =      0.93
  TOTAL AREA(ACRES) =      0.30   TOTAL RUNOFF(CFS) =      0.93

****************************************************************************
  FLOW PROCESS FROM NODE    102.00 TO NODE    160.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  CHANNEL LENGTH THRU SUBAREA(FEET) =   650.00
  REPRESENTATIVE CHANNEL SLOPE =  0.1000
  CHANNEL BASE(FEET) =    5.00   "Z" FACTOR =  10.000
  MANNING'S FACTOR = 0.040   MAXIMUM DEPTH(FEET) =  10.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.070
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .3200
  S.C.S. CURVE NUMBER (AMC II) =   0
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      10.43
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   4.30
  AVERAGE FLOW DEPTH(FEET) =   0.30   TRAVEL TIME(MIN.) =   2.52
  Tc(MIN.) =    8.73
  SUBAREA AREA(ACRES) =     9.60       SUBAREA RUNOFF(CFS) =   18.65
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.323
  TOTAL AREA(ACRES) =        9.9         PEAK FLOW RATE(CFS) =      19.39

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.42   FLOW VELOCITY(FEET/SEC.) =   5.08
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    160.00 =     750.00 FEET.
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =        9.9  TC(MIN.) =      8.73
  PEAK FLOW RATE(CFS)   =      19.39
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

♀

APPENDIX A2

Proposed Condition AES Output

[100-Year, Undetained]

```
**************************************************************************

            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
            Reference: SAN DIEGO COUNTY FLOOD CONTROL DISTRICT
                         2003,1985,1981 HYDROLOGY MANUAL
          (c) Copyright 1982-2014 Advanced Engineering Software (aes)
              Ver. 21.0 Release Date: 06/01/2014  License ID 1261

                            Analysis prepared by:

                           Rick Engineering Company
                           1160 Marsh St. Suite 150
                          San Luis Obispo, CA 93401


 ************************** DESCRIPTION OF STUDY **************************
* JAMUL RETAIL CENTER, J-18145                                            *
* 100-YR, 6-HR POST-PROJECT CONDITION FOR BASIN 100, UNDETAINED           *
* J:\18145\WATERRESOURCES\HYDROLOGY\RATIONALMETHOD\..                     *
 **************************************************************************

  FILE NAME: JR100P.RAT
  TIME/DATE OF STUDY: 09:10 07/06/2018
--------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
--------------------------------------------------------------------------
  2003 SAN DIEGO MANUAL CRITERIA

  USER SPECIFIED STORM EVENT(YEAR) = 100.00
  6-HOUR DURATION PRECIPITATION (INCHES) =   3.300
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.95
  SAN DIEGO HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD
  NOTE: USE MODIFIED RATIONAL METHOD PROCEDURES FOR CONFLUENCE ANALYSIS
  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  ========  ================  ======  ===== ====== ===== =======
  1   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0313 0.167 0.0150
  2   30.0     25.0    0.020/0.020/0.020   0.50    1.50 0.0313 0.125 0.0180

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  0.50 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint =  6.0 (FT*FT/S)
  *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
   OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*

**************************************************************************
  FLOW PROCESS FROM NODE    100.00 TO NODE    102.00 IS CODE =  21
--------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
==========================================================================
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .8300
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    70.00
  UPSTREAM ELEVATION(FEET) =    998.00
  DOWNSTREAM ELEVATION(FEET) =    997.20
  ELEVATION DIFFERENCE(FEET) =      0.80
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    3.889
```

```
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.695
 NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
 SUBAREA RUNOFF(CFS) =      0.72
 TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.72

****************************************************************************
 FLOW PROCESS FROM NODE    102.00 TO NODE    104.00 IS CODE =  62
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
 REPRESENTATIVE SLOPE =  0.0200
 STREET LENGTH(FEET) =   100.00   CURB HEIGHT(INCHES) =  8.0
 STREET HALFWIDTH(FEET) = 30.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  20.00
 INSIDE STREET CROSSFALL(DECIMAL) =  0.018
 OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
 STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
 Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
 Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.08
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.25
   HALFSTREET FLOOD WIDTH(FEET) =    5.03
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.58
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.65
 STREET FLOW TRAVEL TIME(MIN.) =   0.65   Tc(MIN.) =    4.54
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.695
 NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
 *USER SPECIFIED(SUBAREA):
 USER-SPECIFIED RUNOFF COEFFICIENT = .8300
 S.C.S. CURVE NUMBER (AMC II) =   0
 AREA-AVERAGE RUNOFF COEFFICIENT =  0.830
 SUBAREA AREA(ACRES) =    0.10      SUBAREA RUNOFF(CFS) =    0.72
 TOTAL AREA(ACRES) =        0.2        PEAK FLOW RATE(CFS) =       1.44

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.27   HALFSTREET FLOOD WIDTH(FEET) =   6.28
 FLOW VELOCITY(FEET/SEC.) =  2.64   DEPTH*VELOCITY(FT*FT/SEC.) =   0.73
 LONGEST FLOWPATH FROM NODE    100.00 TO NODE    104.00 =     170.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    104.00 TO NODE    106.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 REPRESENTATIVE SLOPE =  0.0050
 FLOW LENGTH(FEET) =   225.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  18.0 INCH PIPE IS   5.5 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   3.20
 GIVEN PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       1.44
 PIPE TRAVEL TIME(MIN.) =   1.17    Tc(MIN.) =    5.71
 LONGEST FLOWPATH FROM NODE    100.00 TO NODE    106.00 =     395.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    106.00 TO NODE    106.00 IS CODE =  81
----------------------------------------------------------------------------
```

```
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
================================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.982
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .8300
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.8300
  SUBAREA AREA(ACRES) =    2.20   SUBAREA RUNOFF(CFS) =   14.57
  TOTAL AREA(ACRES) =        2.4   TOTAL RUNOFF(CFS) =      15.90
  TC(MIN.) =    5.71

****************************************************************************
  FLOW PROCESS FROM NODE    106.00 TO NODE    108.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
================================================================================
  REPRESENTATIVE SLOPE =  0.0050
  FLOW LENGTH(FEET) =   160.00   MANNING'S N =  0.013
  ASSUME FULL-FLOWING PIPELINE
  PIPE-FLOW VELOCITY(FEET/SEC.) =   9.00
  PIPE FLOW VELOCITY = (TOTAL FLOW)/(PIPE CROSS SECTION AREA)
  GIVEN PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      15.90
  PIPE TRAVEL TIME(MIN.) =   0.30    Tc(MIN.) =    6.01
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    108.00 =     555.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    108.00 TO NODE    108.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
================================================================================
  TOTAL NUMBER OF STREAMS =  3
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =    6.01
  RAINFALL INTENSITY(INCH/HR) =   7.73
  TOTAL STREAM AREA(ACRES) =     2.40
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     15.90

****************************************************************************
  FLOW PROCESS FROM NODE    110.00 TO NODE    112.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
================================================================================
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .3000
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    50.00
  UPSTREAM ELEVATION(FEET) =    984.00
  DOWNSTREAM ELEVATION(FEET) =    983.50
  ELEVATION DIFFERENCE(FEET) =      0.50
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =   10.182
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.496
  SUBAREA RUNOFF(CFS) =      0.16
  TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.16

****************************************************************************
  FLOW PROCESS FROM NODE    112.00 TO NODE    114.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
================================================================================
  CHANNEL LENGTH THRU SUBAREA(FEET) =   270.00
```

```
  REPRESENTATIVE CHANNEL SLOPE =  0.0050
  CHANNEL BASE(FEET) =    0.50   "Z" FACTOR =   2.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   2.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.791
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .3000
  S.C.S. CURVE NUMBER (AMC II) =   0
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       0.38
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   1.86
  AVERAGE FLOW DEPTH(FEET) =   0.22   TRAVEL TIME(MIN.) =   2.42
  Tc(MIN.) =   12.60
  SUBAREA AREA(ACRES) =     0.30       SUBAREA RUNOFF(CFS) =    0.43
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.300
  TOTAL AREA(ACRES) =        0.4         PEAK FLOW RATE(CFS) =       0.57

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.26   FLOW VELOCITY(FEET/SEC.) =   2.12
  LONGEST FLOWPATH FROM NODE    110.00 TO NODE    114.00 =     320.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    114.00 TO NODE    108.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  REPRESENTATIVE SLOPE =  0.0050
  FLOW LENGTH(FEET) =   420.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   3.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   2.46
  GIVEN PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       0.57
  PIPE TRAVEL TIME(MIN.) =   2.85    Tc(MIN.) =   15.45
  LONGEST FLOWPATH FROM NODE    110.00 TO NODE    108.00 =     740.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    108.00 TO NODE    108.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  3
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =   15.45
  RAINFALL INTENSITY(INCH/HR) =   4.20
  TOTAL STREAM AREA(ACRES) =     0.40
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      0.57

****************************************************************************
  FLOW PROCESS FROM NODE    120.00 TO NODE    122.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .8300
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    70.00
  UPSTREAM ELEVATION(FEET) =    998.00
  DOWNSTREAM ELEVATION(FEET) =    997.20
  ELEVATION DIFFERENCE(FEET) =      0.80
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    3.889
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.695
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  SUBAREA RUNOFF(CFS) =      0.72
  TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.72
```

```
****************************************************************************
  FLOW PROCESS FROM NODE    122.00 TO NODE    124.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  REPRESENTATIVE SLOPE =  0.0100
  STREET LENGTH(FEET) =   130.00   CURB HEIGHT(INCHES) =  8.0
  STREET HALFWIDTH(FEET) = 30.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  20.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.08
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.28
    HALFSTREET FLOOD WIDTH(FEET) =    6.47
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    1.91
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.53
  STREET FLOW TRAVEL TIME(MIN.) =   1.14   Tc(MIN.) =    5.03
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.665
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .8300
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.830
  SUBAREA AREA(ACRES) =    0.10      SUBAREA RUNOFF(CFS) =    0.72
  TOTAL AREA(ACRES) =        0.2        PEAK FLOW RATE(CFS) =       1.44

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.30   HALFSTREET FLOOD WIDTH(FEET) =   7.72
  FLOW VELOCITY(FEET/SEC.) =  1.98   DEPTH*VELOCITY(FT*FT/SEC.) =   0.60
  LONGEST FLOWPATH FROM NODE    120.00 TO NODE    124.00 =     200.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    124.00 TO NODE    126.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  REPRESENTATIVE SLOPE =  0.0050
  FLOW LENGTH(FEET) =   170.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   5.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   3.20
  GIVEN PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       1.44
  PIPE TRAVEL TIME(MIN.) =   0.89    Tc(MIN.) =    5.91
  LONGEST FLOWPATH FROM NODE    120.00 TO NODE    126.00 =     370.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    126.00 TO NODE    126.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.804
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .6500
```

```
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.6777
  SUBAREA AREA(ACRES) =    1.10   SUBAREA RUNOFF(CFS) =    5.58
  TOTAL AREA(ACRES) =        1.3   TOTAL RUNOFF(CFS) =       6.88
  TC(MIN.) =    5.91

****************************************************************************
  FLOW PROCESS FROM NODE    126.00 TO NODE    108.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  REPRESENTATIVE SLOPE =  0.0050
  FLOW LENGTH(FEET) =   520.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  14.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.66
  GIVEN PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       6.88
  PIPE TRAVEL TIME(MIN.) =   1.86    Tc(MIN.) =    7.77
  LONGEST FLOWPATH FROM NODE    120.00 TO NODE    108.00 =     890.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    108.00 TO NODE    108.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  3
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  3 ARE:
  TIME OF CONCENTRATION(MIN.) =    7.77
  RAINFALL INTENSITY(INCH/HR) =   6.54
  TOTAL STREAM AREA(ACRES) =     1.30
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      6.88

  ** CONFLUENCE DATA **
  STREAM     RUNOFF       Tc      INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
      1       15.90     6.01        7.726          2.40
      2        0.57    15.45        4.201          0.40
      3        6.88     7.77        6.542          1.30

  RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
  CONFLUENCE FORMULA USED FOR  3 STREAMS.

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF      Tc      INTENSITY
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
      1       21.44     6.01       7.726
      2       20.63     7.77       6.542
      3       13.63    15.45       4.201

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      21.44   Tc(MIN.) =    6.01
  TOTAL AREA(ACRES) =        4.1
  LONGEST FLOWPATH FROM NODE    120.00 TO NODE    108.00 =     890.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    108.00 TO NODE    134.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  REPRESENTATIVE SLOPE =  0.0050
```

```
  FLOW LENGTH(FEET) =    50.00   MANNING'S N =  0.013
  ASSUME FULL-FLOWING PIPELINE
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.82
  PIPE FLOW VELOCITY = (TOTAL FLOW)/(PIPE CROSS SECTION AREA)
  GIVEN PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      21.44
  PIPE TRAVEL TIME(MIN.) =   0.12    Tc(MIN.) =    6.13
  LONGEST FLOWPATH FROM NODE    120.00 TO NODE    134.00 =     940.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    134.00 TO NODE    134.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.626
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .3000
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.6918
  SUBAREA AREA(ACRES) =    0.40   SUBAREA RUNOFF(CFS) =    0.92
  TOTAL AREA(ACRES) =        4.5   TOTAL RUNOFF(CFS) =      23.74
  TC(MIN.) =    6.13

****************************************************************************
  FLOW PROCESS FROM NODE    134.00 TO NODE    135.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  REPRESENTATIVE SLOPE =  0.0200
  FLOW LENGTH(FEET) =   180.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  24.0 INCH PIPE IS  15.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  10.92
  GIVEN PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      23.74
  PIPE TRAVEL TIME(MIN.) =   0.27    Tc(MIN.) =    6.40
  LONGEST FLOWPATH FROM NODE    120.00 TO NODE    135.00 =    1120.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    135.00 TO NODE    135.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =    6.40
  RAINFALL INTENSITY(INCH/HR) =   7.41
  TOTAL STREAM AREA(ACRES) =     4.50
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     23.74

****************************************************************************
  FLOW PROCESS FROM NODE    140.00 TO NODE    142.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .8300
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  UPSTREAM ELEVATION(FEET) =    992.00
  DOWNSTREAM ELEVATION(FEET) =    985.00
  ELEVATION DIFFERENCE(FEET) =      7.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    2.541
```

```
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.695
 NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
 SUBAREA RUNOFF(CFS) =      0.72
 TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.72

****************************************************************************
 FLOW PROCESS FROM NODE    142.00 TO NODE    144.00 IS CODE =  62
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
 REPRESENTATIVE SLOPE =  0.0500
 STREET LENGTH(FEET) =   300.00   CURB HEIGHT(INCHES) =  8.0
 STREET HALFWIDTH(FEET) = 30.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  20.00
 INSIDE STREET CROSSFALL(DECIMAL) =  0.018
 OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
 STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
 Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
 Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.44
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.24
   HALFSTREET FLOOD WIDTH(FEET) =    4.28
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    4.04
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.96
 STREET FLOW TRAVEL TIME(MIN.) =   1.24   Tc(MIN.) =    3.78
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.695
 NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
 *USER SPECIFIED(SUBAREA):
 USER-SPECIFIED RUNOFF COEFFICIENT = .8300
 S.C.S. CURVE NUMBER (AMC II) =   0
 AREA-AVERAGE RUNOFF COEFFICIENT =  0.830
 SUBAREA AREA(ACRES) =    0.20      SUBAREA RUNOFF(CFS) =    1.44
 TOTAL AREA(ACRES) =        0.3        PEAK FLOW RATE(CFS) =       2.16

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.27   HALFSTREET FLOOD WIDTH(FEET) =   6.03
 FLOW VELOCITY(FEET/SEC.) =  4.17   DEPTH*VELOCITY(FT*FT/SEC.) =   1.13
 LONGEST FLOWPATH FROM NODE    140.00 TO NODE    144.00 =     400.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    144.00 TO NODE    146.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 REPRESENTATIVE SLOPE =  0.0050
 FLOW LENGTH(FEET) =   480.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  18.0 INCH PIPE IS   6.7 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   3.58
 GIVEN PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       2.16
 PIPE TRAVEL TIME(MIN.) =   2.24    Tc(MIN.) =    6.02
 LONGEST FLOWPATH FROM NODE    140.00 TO NODE    146.00 =     880.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    146.00 TO NODE    146.00 IS CODE =  81
----------------------------------------------------------------------------
```

```
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
================================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.718
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .9000
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.8940
  SUBAREA AREA(ACRES) =    3.20   SUBAREA RUNOFF(CFS) =   22.23
  TOTAL AREA(ACRES) =        3.5   TOTAL RUNOFF(CFS) =      24.15
  TC(MIN.) =    6.02

********************************************************************************
  FLOW PROCESS FROM NODE    146.00 TO NODE    135.00 IS CODE =  41
--------------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
================================================================================
  REPRESENTATIVE SLOPE =  0.0050
  FLOW LENGTH(FEET) =    60.00   MANNING'S N =  0.013
  ASSUME FULL-FLOWING PIPELINE
  PIPE-FLOW VELOCITY(FEET/SEC.) =   7.69
  PIPE FLOW VELOCITY = (TOTAL FLOW)/(PIPE CROSS SECTION AREA)
  GIVEN PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      24.15
  PIPE TRAVEL TIME(MIN.) =   0.13    Tc(MIN.) =    6.15
  LONGEST FLOWPATH FROM NODE    140.00 TO NODE    135.00 =     940.00 FEET.

********************************************************************************
  FLOW PROCESS FROM NODE    135.00 TO NODE    135.00 IS CODE =   1
--------------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
================================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =    6.15
  RAINFALL INTENSITY(INCH/HR) =   7.61
  TOTAL STREAM AREA(ACRES) =     3.50
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     24.15

  ** CONFLUENCE DATA **
  STREAM     RUNOFF       Tc      INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
      1       23.74     6.40        7.413          4.50
      2       24.15     6.15        7.612          3.50

  RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
  CONFLUENCE FORMULA USED FOR  2 STREAMS.

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF      Tc      INTENSITY
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
      1       47.27     6.15       7.612
      2       47.26     6.40       7.413

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      47.27   Tc(MIN.) =    6.15
  TOTAL AREA(ACRES) =        8.0
  LONGEST FLOWPATH FROM NODE    120.00 TO NODE    135.00 =    1120.00 FEET.

********************************************************************************
  FLOW PROCESS FROM NODE    135.00 TO NODE    150.00 IS CODE =  41
--------------------------------------------------------------------------------
```

```
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
================================================================================
  REPRESENTATIVE SLOPE =  0.0050
  FLOW LENGTH(FEET) =   420.00   MANNING'S N =  0.013
  ASSUME FULL-FLOWING PIPELINE
  PIPE-FLOW VELOCITY(FEET/SEC.) =   9.63
  PIPE FLOW VELOCITY = (TOTAL FLOW)/(PIPE CROSS SECTION AREA)
  GIVEN PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      47.27
  PIPE TRAVEL TIME(MIN.) =   0.73    Tc(MIN.) =    6.87
  LONGEST FLOWPATH FROM NODE    120.00 TO NODE    150.00 =    1540.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    150.00 TO NODE    150.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.082
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .3000
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7416
  SUBAREA AREA(ACRES) =    0.70   SUBAREA RUNOFF(CFS) =    1.49
  TOTAL AREA(ACRES) =       8.7   TOTAL RUNOFF(CFS) =     47.27
  TC(MIN.) =    6.87
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE    160.10 TO NODE    160.20 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .3000
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    45.00
  UPSTREAM ELEVATION(FEET) =    969.67
  DOWNSTREAM ELEVATION(FEET) =    950.00
  ELEVATION DIFFERENCE(FEET) =     19.67
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    4.484
  WARNING: THE MAXIMUM OVERLAND FLOW SLOPE, 10.%, IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.695
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  SUBAREA RUNOFF(CFS) =      0.26
  TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.26

****************************************************************************
  FLOW PROCESS FROM NODE    106.20 TO NODE    160.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  CHANNEL LENGTH THRU SUBAREA(FEET) =    45.00
  REPRESENTATIVE CHANNEL SLOPE =  0.5000
  CHANNEL BASE(FEET) =    5.00   "Z" FACTOR =  20.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   0.50
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.695
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .3000
  S.C.S. CURVE NUMBER (AMC II) =   0
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.70
```

```
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   4.73
  AVERAGE FLOW DEPTH(FEET) =   0.06   TRAVEL TIME(MIN.) =   0.16
  Tc(MIN.) =    4.64
  SUBAREA AREA(ACRES) =     1.10       SUBAREA RUNOFF(CFS) =    2.87
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.300
  TOTAL AREA(ACRES) =        1.2         PEAK FLOW RATE(CFS) =       3.13

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.08   FLOW VELOCITY(FEET/SEC.) =   5.83
  LONGEST FLOWPATH FROM NODE    160.10 TO NODE    160.00 =      90.00 FEET.
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =        1.2  TC(MIN.) =      4.64
  PEAK FLOW RATE(CFS)   =       3.13
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

♀

Jamul Retail Center
J-18145
10/9/2018

Confluence Analysis - Post-Project Un-detained Condition

The purpose of this sheet is to provide the confluenced Q for 2 streams, based on the 2003 County of San Diego hydrology criteria.

	P_6 (in)	3.3	(100-Yr, 6-Hr)

At Node: Total Site

Let:	Q_1 (cfs)	3.13	
	T_1 (min)	4.64	(Sheet flow to POI 2)
	I_1 (in/hr)	9.1239	
	Q_2 (cfs)	47.27	(Flow to POI 1 - Outfall)
	T_2 (min)	6.87	
	I_2 (in/hr)	7.0835	
Then:	Q_{T1} (cfs)	35.06	
	Q_{T2} (cfs)	49.70	

Final Results: (Choosing the largest Q and the associated T_c)

	Q_T (cfs)	49.70	Total Site Peak Discharge Rate
	T_c (min)	6.87	

APPENDIX A3

Proposed Condition AES Output

[100-Year, Detained]

```
**************************************************************************

            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
            Reference: SAN DIEGO COUNTY FLOOD CONTROL DISTRICT
                         2003,1985,1981 HYDROLOGY MANUAL
          (c) Copyright 1982-2014 Advanced Engineering Software (aes)
              Ver. 21.0 Release Date: 06/01/2014  License ID 1261

                              Analysis prepared by:

                            RICK ENGINEERING COMPANY
                                5620 Friars Road
                              San Diego, California 92110
                           619-291-0707   Fax 619-291-4165

 ************************** DESCRIPTION OF STUDY **************************
* JAMUL RETAIL CENTER, J-18145                                            *
* 100-YR, 6-HR POST-PROJECT CONDITION FOR BASIN 100, DETAINED             *
* J:\18145\WATERRESOURCES\HYDROLOGY\RATIONALMETHOD\..                     *
 **************************************************************************

  FILE NAME: JR100P1H.RAT
  TIME/DATE OF STUDY: 13:53 07/09/2018
--------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
--------------------------------------------------------------------------
  2003 SAN DIEGO MANUAL CRITERIA

  USER SPECIFIED STORM EVENT(YEAR) = 100.00
  6-HOUR DURATION PRECIPITATION (INCHES) =   3.300
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.95
  SAN DIEGO HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD
  NOTE: USE MODIFIED RATIONAL METHOD PROCEDURES FOR CONFLUENCE ANALYSIS
  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  ========  ================  ======  ===== ====== ===== =======
  1   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0313 0.167 0.0150
  2   30.0     25.0    0.020/0.020/0.020   0.50    1.50 0.0313 0.125 0.0180

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  0.50 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint =  6.0 (FT*FT/S)
  *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
   OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*

**************************************************************************
  FLOW PROCESS FROM NODE    100.00 TO NODE    102.00 IS CODE =  21
--------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
==========================================================================
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .8300
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    70.00
  UPSTREAM ELEVATION(FEET) =    998.00
  DOWNSTREAM ELEVATION(FEET) =    997.20
  ELEVATION DIFFERENCE(FEET) =      0.80
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    3.889
```

```
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.695
 NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
 SUBAREA RUNOFF(CFS) =      0.72
 TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.72

****************************************************************************
 FLOW PROCESS FROM NODE    102.00 TO NODE    104.00 IS CODE =  62
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
 REPRESENTATIVE SLOPE =  0.0200
 STREET LENGTH(FEET) =   100.00   CURB HEIGHT(INCHES) =  8.0
 STREET HALFWIDTH(FEET) = 30.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  20.00
 INSIDE STREET CROSSFALL(DECIMAL) =  0.018
 OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
 STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
 Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
 Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.08
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.25
   HALFSTREET FLOOD WIDTH(FEET) =    5.03
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.58
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.65
 STREET FLOW TRAVEL TIME(MIN.) =   0.65   Tc(MIN.) =    4.54
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.695
 NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
 *USER SPECIFIED(SUBAREA):
 USER-SPECIFIED RUNOFF COEFFICIENT = .8300
 S.C.S. CURVE NUMBER (AMC II) =   0
 AREA-AVERAGE RUNOFF COEFFICIENT =  0.830
 SUBAREA AREA(ACRES) =    0.10      SUBAREA RUNOFF(CFS) =    0.72
 TOTAL AREA(ACRES) =        0.2        PEAK FLOW RATE(CFS) =       1.44

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.27   HALFSTREET FLOOD WIDTH(FEET) =   6.28
 FLOW VELOCITY(FEET/SEC.) =  2.64   DEPTH*VELOCITY(FT*FT/SEC.) =   0.73
 LONGEST FLOWPATH FROM NODE    100.00 TO NODE    104.00 =     170.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    104.00 TO NODE    106.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 REPRESENTATIVE SLOPE =  0.0050
 FLOW LENGTH(FEET) =   225.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  18.0 INCH PIPE IS   5.5 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   3.20
 GIVEN PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       1.44
 PIPE TRAVEL TIME(MIN.) =   1.17    Tc(MIN.) =    5.71
 LONGEST FLOWPATH FROM NODE    100.00 TO NODE    106.00 =     395.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    106.00 TO NODE    106.00 IS CODE =  81
----------------------------------------------------------------------------
```

```
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
================================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.982
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .8300
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.8300
  SUBAREA AREA(ACRES) =    2.20   SUBAREA RUNOFF(CFS) =   14.57
  TOTAL AREA(ACRES) =        2.4   TOTAL RUNOFF(CFS) =      15.90
  TC(MIN.) =    5.71

+------------------------------------------------------------------------------+
| THE CODE 7 BELOW IS THE DETAINED 100-YEAR PEAK FLOW AND Tc FROM BMP-2        |
|                                                                              |
|                                                                              |
+------------------------------------------------------------------------------+

********************************************************************************
  FLOW PROCESS FROM NODE    106.00 TO NODE    106.00 IS CODE =   7
--------------------------------------------------------------------------------
  >>>>>USER SPECIFIED HYDROLOGY INFORMATION AT NODE<<<<<
================================================================================
  USER-SPECIFIED VALUES ARE AS FOLLOWS:
  TC(MIN) =  10.51   RAIN INTENSITY(INCH/HOUR) =  5.38
  TOTAL AREA(ACRES) =     2.40   TOTAL RUNOFF(CFS) =      4.70

********************************************************************************
  FLOW PROCESS FROM NODE    106.00 TO NODE    108.00 IS CODE =  41
--------------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
================================================================================
  REPRESENTATIVE SLOPE =  0.0050
  FLOW LENGTH(FEET) =   160.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  10.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.36
  GIVEN PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       4.70
  PIPE TRAVEL TIME(MIN.) =   0.61    Tc(MIN.) =   11.12
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    108.00 =     555.00 FEET.

********************************************************************************
  FLOW PROCESS FROM NODE    108.00 TO NODE    108.00 IS CODE =   1
--------------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
================================================================================
  TOTAL NUMBER OF STREAMS =  3
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   11.12
  RAINFALL INTENSITY(INCH/HR) =   5.19
  TOTAL STREAM AREA(ACRES) =     2.40
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      4.70

********************************************************************************
  FLOW PROCESS FROM NODE    110.00 TO NODE    112.00 IS CODE =  21
--------------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
================================================================================
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .3000
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    50.00
  UPSTREAM ELEVATION(FEET) =    984.00
```

```
 DOWNSTREAM ELEVATION(FEET) =    983.50
 ELEVATION DIFFERENCE(FEET) =      0.50
 SUBAREA OVERLAND TIME OF FLOW(MIN.) =   10.182
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.496
 SUBAREA RUNOFF(CFS) =      0.16
 TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.16

****************************************************************************
 FLOW PROCESS FROM NODE    112.00 TO NODE    114.00 IS CODE =  51
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
 CHANNEL LENGTH THRU SUBAREA(FEET) =   270.00
 REPRESENTATIVE CHANNEL SLOPE =  0.0050
 CHANNEL BASE(FEET) =    0.50   "Z" FACTOR =   2.000
 MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   2.00
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.791
 *USER SPECIFIED(SUBAREA):
 USER-SPECIFIED RUNOFF COEFFICIENT = .3000
 S.C.S. CURVE NUMBER (AMC II) =   0
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       0.38
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   1.86
 AVERAGE FLOW DEPTH(FEET) =   0.22   TRAVEL TIME(MIN.) =   2.42
 Tc(MIN.) =   12.60
 SUBAREA AREA(ACRES) =     0.30       SUBAREA RUNOFF(CFS) =    0.43
 AREA-AVERAGE RUNOFF COEFFICIENT =  0.300
 TOTAL AREA(ACRES) =        0.4         PEAK FLOW RATE(CFS) =       0.57

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) =  0.26   FLOW VELOCITY(FEET/SEC.) =   2.12
 LONGEST FLOWPATH FROM NODE    110.00 TO NODE    114.00 =     320.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    114.00 TO NODE    108.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 REPRESENTATIVE SLOPE =  0.0050
 FLOW LENGTH(FEET) =   420.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  18.0 INCH PIPE IS   3.4 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   2.46
 GIVEN PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       0.57
 PIPE TRAVEL TIME(MIN.) =   2.85    Tc(MIN.) =   15.45
 LONGEST FLOWPATH FROM NODE    110.00 TO NODE    108.00 =     740.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    108.00 TO NODE    108.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  3
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
 TIME OF CONCENTRATION(MIN.) =   15.45
 RAINFALL INTENSITY(INCH/HR) =   4.20
 TOTAL STREAM AREA(ACRES) =     0.40
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      0.57

****************************************************************************
 FLOW PROCESS FROM NODE    120.00 TO NODE    122.00 IS CODE =  21
----------------------------------------------------------------------------
```

```
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
================================================================================
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .8300
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    70.00
  UPSTREAM ELEVATION(FEET) =    998.00
  DOWNSTREAM ELEVATION(FEET) =    997.20
  ELEVATION DIFFERENCE(FEET) =      0.80
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    3.889
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.695
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  SUBAREA RUNOFF(CFS) =      0.72
  TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.72

********************************************************************************
  FLOW PROCESS FROM NODE    122.00 TO NODE    124.00 IS CODE =  62
--------------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
================================================================================
  REPRESENTATIVE SLOPE =  0.0100
  STREET LENGTH(FEET) =   130.00   CURB HEIGHT(INCHES) =  8.0
  STREET HALFWIDTH(FEET) = 30.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  20.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.08
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.28
    HALFSTREET FLOOD WIDTH(FEET) =    6.47
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    1.91
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.53
  STREET FLOW TRAVEL TIME(MIN.) =   1.14   Tc(MIN.) =    5.03
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.665
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .8300
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.830
  SUBAREA AREA(ACRES) =    0.10      SUBAREA RUNOFF(CFS) =    0.72
  TOTAL AREA(ACRES) =        0.2        PEAK FLOW RATE(CFS) =       1.44

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.30   HALFSTREET FLOOD WIDTH(FEET) =   7.72
  FLOW VELOCITY(FEET/SEC.) =  1.98   DEPTH*VELOCITY(FT*FT/SEC.) =   0.60
  LONGEST FLOWPATH FROM NODE    120.00 TO NODE    124.00 =     200.00 FEET.

********************************************************************************
  FLOW PROCESS FROM NODE    124.00 TO NODE    126.00 IS CODE =  41
--------------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
================================================================================
  REPRESENTATIVE SLOPE =  0.0050
  FLOW LENGTH(FEET) =   170.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   5.4 INCHES
```

```
  PIPE-FLOW VELOCITY(FEET/SEC.) =   3.20
  GIVEN PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       1.44
  PIPE TRAVEL TIME(MIN.) =   0.89    Tc(MIN.) =    5.91
  LONGEST FLOWPATH FROM NODE    120.00 TO NODE    126.00 =     370.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    126.00 TO NODE    126.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.804
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .6500
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.6777
  SUBAREA AREA(ACRES) =    1.10   SUBAREA RUNOFF(CFS) =    5.58
  TOTAL AREA(ACRES) =        1.3   TOTAL RUNOFF(CFS) =       6.88
  TC(MIN.) =    5.91

+--------------------------------------------------------------------------+
| THE CODE 7 BELOW IS THE DETAINED 100-YR PEAK FLOW AND Tc FROM BMP-3      |
|                                                                          |
|                                                                          |
+--------------------------------------------------------------------------+

****************************************************************************
  FLOW PROCESS FROM NODE    126.00 TO NODE    126.00 IS CODE =   7
----------------------------------------------------------------------------
  >>>>>USER SPECIFIED HYDROLOGY INFORMATION AT NODE<<<<<
============================================================================
  USER-SPECIFIED VALUES ARE AS FOLLOWS:
  TC(MIN) =  10.71   RAIN INTENSITY(INCH/HOUR) =  5.32
  TOTAL AREA(ACRES) =     1.30   TOTAL RUNOFF(CFS) =      2.40

****************************************************************************
  FLOW PROCESS FROM NODE    126.00 TO NODE    108.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  REPRESENTATIVE SLOPE =  0.0050
  FLOW LENGTH(FEET) =   520.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   7.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   3.68
  GIVEN PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       2.40
  PIPE TRAVEL TIME(MIN.) =   2.36    Tc(MIN.) =   13.07
  LONGEST FLOWPATH FROM NODE    120.00 TO NODE    108.00 =     890.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    108.00 TO NODE    108.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  3
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  3 ARE:
  TIME OF CONCENTRATION(MIN.) =   13.07
  RAINFALL INTENSITY(INCH/HR) =   4.68
  TOTAL STREAM AREA(ACRES) =     1.30
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      2.40
```

```
  ** CONFLUENCE DATA **
  STREAM     RUNOFF       Tc      INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
      1        4.70    11.12        5.192          2.40
      2        0.57    15.45        4.201          0.40
      3        2.40    13.07        4.679          1.30

  RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
  CONFLUENCE FORMULA USED FOR  3 STREAMS.

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF      Tc      INTENSITY
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
      1        7.16    11.12       5.192
      2        7.12    13.07       4.679
      3        6.53    15.45       4.201

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =       7.16   Tc(MIN.) =   11.12
  TOTAL AREA(ACRES) =        4.1
  LONGEST FLOWPATH FROM NODE    120.00 TO NODE    108.00 =     890.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    108.00 TO NODE    134.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  REPRESENTATIVE SLOPE =  0.0050
  FLOW LENGTH(FEET) =    50.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  24.0 INCH PIPE IS  11.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.85
  GIVEN PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       7.16
  PIPE TRAVEL TIME(MIN.) =   0.17    Tc(MIN.) =   11.29
  LONGEST FLOWPATH FROM NODE    120.00 TO NODE    134.00 =     940.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    134.00 TO NODE    134.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.141
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .3000
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.3476
  SUBAREA AREA(ACRES) =    0.40   SUBAREA RUNOFF(CFS) =    0.62
  TOTAL AREA(ACRES) =        4.5   TOTAL RUNOFF(CFS) =       8.04
  TC(MIN.) =   11.29

****************************************************************************
  FLOW PROCESS FROM NODE    134.00 TO NODE    135.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  REPRESENTATIVE SLOPE =  0.0200
  FLOW LENGTH(FEET) =   180.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  24.0 INCH PIPE IS   8.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   8.32
  GIVEN PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       8.04
```

```
  PIPE TRAVEL TIME(MIN.) =   0.36    Tc(MIN.) =   11.65
  LONGEST FLOWPATH FROM NODE    120.00 TO NODE    135.00 =    1120.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    135.00 TO NODE    135.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   11.65
  RAINFALL INTENSITY(INCH/HR) =   5.04
  TOTAL STREAM AREA(ACRES) =     4.50
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      8.04

****************************************************************************
  FLOW PROCESS FROM NODE    140.00 TO NODE    142.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .8300
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  UPSTREAM ELEVATION(FEET) =    992.00
  DOWNSTREAM ELEVATION(FEET) =    985.00
  ELEVATION DIFFERENCE(FEET) =      7.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    2.541
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.695
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  SUBAREA RUNOFF(CFS) =      0.72
  TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.72

****************************************************************************
  FLOW PROCESS FROM NODE    142.00 TO NODE    144.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  REPRESENTATIVE SLOPE =  0.0500
  STREET LENGTH(FEET) =   300.00   CURB HEIGHT(INCHES) =  8.0
  STREET HALFWIDTH(FEET) = 30.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  20.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.44
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.24
    HALFSTREET FLOOD WIDTH(FEET) =    4.28
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    4.04
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.96
  STREET FLOW TRAVEL TIME(MIN.) =   1.24   Tc(MIN.) =    3.78
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.695
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .8300
```

```
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.830
  SUBAREA AREA(ACRES) =    0.20      SUBAREA RUNOFF(CFS) =    1.44
  TOTAL AREA(ACRES) =        0.3        PEAK FLOW RATE(CFS) =       2.16

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.27   HALFSTREET FLOOD WIDTH(FEET) =   6.03
  FLOW VELOCITY(FEET/SEC.) =  4.17   DEPTH*VELOCITY(FT*FT/SEC.) =   1.13
  LONGEST FLOWPATH FROM NODE    140.00 TO NODE    144.00 =     400.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    144.00 TO NODE    146.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  REPRESENTATIVE SLOPE =  0.0050
  FLOW LENGTH(FEET) =   480.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   6.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   3.58
  GIVEN PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       2.16
  PIPE TRAVEL TIME(MIN.) =   2.24    Tc(MIN.) =    6.02
  LONGEST FLOWPATH FROM NODE    140.00 TO NODE    146.00 =     880.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    146.00 TO NODE    146.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.718
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .9000
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.8940
  SUBAREA AREA(ACRES) =    3.20   SUBAREA RUNOFF(CFS) =   22.23
  TOTAL AREA(ACRES) =        3.5   TOTAL RUNOFF(CFS) =      24.15
  TC(MIN.) =    6.02

+--------------------------------------------------------------------------+
| THE CODE 7 BELOW IS THE DETAINED 100-YR PEAK FLOW AND Tc FROM BMP-1      |
|                                                                          |
|                                                                          |
+--------------------------------------------------------------------------+

****************************************************************************
  FLOW PROCESS FROM NODE    146.00 TO NODE    146.00 IS CODE =   7
----------------------------------------------------------------------------
  >>>>>USER SPECIFIED HYDROLOGY INFORMATION AT NODE<<<<<
============================================================================
  USER-SPECIFIED VALUES ARE AS FOLLOWS:
  TC(MIN) =  10.80   RAIN INTENSITY(INCH/HOUR) =  5.29
  TOTAL AREA(ACRES) =     3.50   TOTAL RUNOFF(CFS) =      7.30

****************************************************************************
  FLOW PROCESS FROM NODE    146.00 TO NODE    135.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  REPRESENTATIVE SLOPE =  0.0050
  FLOW LENGTH(FEET) =    60.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  24.0 INCH PIPE IS  11.5 INCHES
```

```
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.88
  GIVEN PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       7.30
  PIPE TRAVEL TIME(MIN.) =   0.20    Tc(MIN.) =   11.00
  LONGEST FLOWPATH FROM NODE    140.00 TO NODE    135.00 =     940.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    135.00 TO NODE    135.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =   11.00
  RAINFALL INTENSITY(INCH/HR) =   5.23
  TOTAL STREAM AREA(ACRES) =     3.50
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      7.30

  ** CONFLUENCE DATA **
  STREAM     RUNOFF       Tc      INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
      1        8.04    11.65        5.038          4.50
      2        7.30    11.00        5.227          3.50

  RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
  CONFLUENCE FORMULA USED FOR  2 STREAMS.

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF      Tc      INTENSITY
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
      1       15.05    11.00       5.227
      2       15.08    11.65       5.038

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      15.08   Tc(MIN.) =   11.65
  TOTAL AREA(ACRES) =        8.0
  LONGEST FLOWPATH FROM NODE    120.00 TO NODE    135.00 =    1120.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    135.00 TO NODE    150.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  REPRESENTATIVE SLOPE =  0.0050
  FLOW LENGTH(FEET) =   420.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  30.0 INCH PIPE IS  15.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.85
  GIVEN PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      15.08
  PIPE TRAVEL TIME(MIN.) =   1.20    Tc(MIN.) =   12.85
  LONGEST FLOWPATH FROM NODE    120.00 TO NODE    150.00 =    1540.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    150.00 TO NODE    150.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.730
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .3000
  S.C.S. CURVE NUMBER (AMC II) =   0
```

AREA-AVERAGE RUNOFF COEFFICIENT = 0.3625
SUBAREA AREA(ACRES) = 0.70 SUBAREA RUNOFF(CFS) = 0.99
TOTAL AREA(ACRES) = 8.7 TOTAL RUNOFF(CFS) = 15.08
TC(MIN.) = 12.85
NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

+--+
| NODE 150 REPRESENTS THE SINGLE PROPOSED OUTFALL FOR THE PROJECT SITE |
| NODE 160 REPRESENTS THE FILL SLOPE ALONG THE WESTERN PERIMETER OF THE |
| PROJECT SITE |
+--+

****
FLOW PROCESS FROM NODE 160.10 TO NODE 160.20 IS CODE = 21

>>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
==========
*USER SPECIFIED(SUBAREA):
USER-SPECIFIED RUNOFF COEFFICIENT = .3000
S.C.S. CURVE NUMBER (AMC II) = 0
INITIAL SUBAREA FLOW-LENGTH(FEET) = 45.00
UPSTREAM ELEVATION(FEET) = 969.67
DOWNSTREAM ELEVATION(FEET) = 950.00
ELEVATION DIFFERENCE(FEET) = 19.67
SUBAREA OVERLAND TIME OF FLOW(MIN.) = 4.484
WARNING: THE MAXIMUM OVERLAND FLOW SLOPE, 10.%, IS USED IN Tc CALCULATION!
100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 8.695
NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
SUBAREA RUNOFF(CFS) = 0.26
TOTAL AREA(ACRES) = 0.10 TOTAL RUNOFF(CFS) = 0.26

****
FLOW PROCESS FROM NODE 106.20 TO NODE 160.00 IS CODE = 51

>>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
>>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==========
CHANNEL LENGTH THRU SUBAREA(FEET) = 45.00
REPRESENTATIVE CHANNEL SLOPE = 0.5000
CHANNEL BASE(FEET) = 5.00 "Z" FACTOR = 20.000
MANNING'S FACTOR = 0.030 MAXIMUM DEPTH(FEET) = 0.50
100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 8.695
NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
*USER SPECIFIED(SUBAREA):
USER-SPECIFIED RUNOFF COEFFICIENT = .3000
S.C.S. CURVE NUMBER (AMC II) = 0
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 1.70
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 4.73
AVERAGE FLOW DEPTH(FEET) = 0.06 TRAVEL TIME(MIN.) = 0.16
Tc(MIN.) = 4.64
SUBAREA AREA(ACRES) = 1.10 SUBAREA RUNOFF(CFS) = 2.87
AREA-AVERAGE RUNOFF COEFFICIENT = 0.300
TOTAL AREA(ACRES) = 1.2 PEAK FLOW RATE(CFS) = 3.13

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH(FEET) = 0.08 FLOW VELOCITY(FEET/SEC.) = 5.83
LONGEST FLOWPATH FROM NODE 160.10 TO NODE 160.00 = 90.00 FEET.
==========
END OF STUDY SUMMARY:
TOTAL AREA(ACRES) = 1.2 TC(MIN.) = 4.64
PEAK FLOW RATE(CFS) = 3.13
==========
==========

END OF RATIONAL METHOD ANALYSIS

♀

Jamul Retail Center
J-18145
10/9/2018

Confluence Analysis - Post-Project Detained Condition

The purpose of this sheet is to provide the confluenced Q for 2 streams, based on the 2003 County of San Diego hydrology criteria.

	P_6 (in)	3.3	(100-Yr, 6-Hr)

At Node: Total Site

Let:	Q_1 (cfs)	3.13	
	T_1 (min)	4.64	(Sheet flow to POI 2)
	I_1 (in/hr)	9.1239	
	Q_2 (cfs)	15.10	(Flow to POI 1 - Outfall)
	T_2 (min)	12.85	
	I_2 (in/hr)	4.7298	
Then:	Q_{T1} (cfs)	8.58	
	Q_{T2} (cfs)	16.72	

Final Results: (Choosing the largest Q and the associated T_c)

	Q_T (cfs)	16.72	Total Site Peak Discharge Rate
	T_c (min)	12.85	

APPENDIX A4

AES Analysis Back-Up

Hydrologic Soil Group—San Diego County Area, California
(Jamul Retail Center)

Map Scale: 1:2,450 if printed on A portrait (8.5" x 11") sheet.

N

Meters: 0 35 70 140 210

Feet: 0 100 200 400 600

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 11N WGS84

MAP LEGEND

Area of Interest (AOI)

Area of Interest (AOI)

Soils

Soil Rating Polygons

A
A/D
B
B/D
C
C/D
D
Not rated or not available

Soil Rating Lines

A
A/D
B
B/D
C
C/D
D
Not rated or not available

Soil Rating Points

A
A/D
B
B/D
C
C/D
D
Not rated or not available

Water Features

Streams and Canals

Transportation

Rails
Interstate Highways
US Routes
Major Roads
Local Roads

Background

Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: San Diego County Area, California
Survey Area Data: Version 12, Sep 13, 2017

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Dec 31, 2009—Mar 11, 2017

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
CmrG	Cieneba very rocky coarse sandy loam, 30 to 75 percent slopes	D	4.4	16.8%
FaC2	Fallbrook sandy loam, 5 to 9 percent slopes, eroded	C	3.4	13.1%
FaE2	Fallbrook sandy loam, 15 to 30 percent slopes, eroded	C	0.3	1.0%
PeD2	Placentia sandy loam, 9 to 15 percent slopes, eroded	D	0.9	3.3%
PfC	Placentia sandy loam, thick surface, 2 to 9 percent slo pes	D	0.0	0.1%
RaC2	Ramona sandy loam, 5 to 9 percent slopes, eroded	C	12.2	46.9%
RaD2	Ramona sandy loam, 9 to 15 percent slopes, eroded	C	4.9	18.7%
Totals for Area of Interest			**26.0**	**100.0%**

Description

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The soils in the United States are assigned to four groups (A, B, C, and D) and three dual classes (A/D, B/D, and C/D). The groups are defined as follows:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. Only the soils that in their natural condition are in group D are assigned to dual classes.

Rating Options

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

RICK ENGINEERING COMPANY™
1160 Marsh Street, Suite 150
San Luis Obispo, CA 93401
Tel: (805) 544-0707

Date 7/6/18
Job No. 18145
Page
Done By TWK
Checked By

JAMUL RETAIL CENTER

- DETAINED AES RATIONAL METHOD BACKUP (CODE 7's)

BMP-1

TOTAL TRIBUTARY AREA = 3.5 AC

T_C = 6.0 MIN (FROM AES) + 0.08 (60 MIN) (LAG PER HEC-1) = 10.80 MIN

$Q_{P\,DETAINED}$ = 7.3 CFS

BMP-2

TOTAL TRIBUTARY AREA = 2.4 AC

T_C = 5.71 MIN (FROM AES) + 0.08 (60 MIN) (LAG PER HEC-1) = 10.51 MIN

$Q_{P\,DETAINED}$ = 4.7 CFS

BMP-3

TOTAL TRIBUTARY AREA = 1.3 AC

T_C = 5.91 MIN (FROM AES) + 0.08 (60 MIN) (LAG PER HEC-1) = 10.71 MIN

$Q_{P\,DETAINED}$ = 2.4 CFS

APPENDIX B

Preliminary Storm Drain Sizing Calculations

Jamul Retail Center
18145
7-10-2018

Preliminary Storm Drain Size

The purpose of this table is to provide an estimated pipe size to convey the 100-year flow rates with a sizing factor.

Manning's n: 0.013

Sizing Factor (%): 30

			Slope at:	0.5%		1.0%		2.0%		3.0%	
Q_{100} (cfs[1])	**Pipe Segment (Node to Node)**	**Q_{100} with Sizing Factor (cfs[1])**		**Minimum Pipe Size[2] (feet)**	**Recommended Pipe Size (inches)**	**Minimum Pipe Size[2] (feet)**	**Recommended Pipe Size (inches)**	**Minimum Pipe Size [2] (feet)**	**Recommended Pipe Size (inches)**	**Minimum Pipe Size[2] (feet)**	**Recommended Pipe Size (inches)**
1.4	104 to 106	1.9		0.89	12"	0.78	10"	0.69	10"	0.64	8"
4.7	106 to 108	6.1		1.39	18"	1.22	18"	1.07	18"	1.00	12"
0.6	114 to 108	0.8		0.64	8"	0.57	8"	0.50	6"	0.46	6"
1.4	124 to 126	1.8		0.88	12"	0.78	10"	0.68	10"	0.63	8"
2.4	126 to 108	3.1		1.08	18"	0.95	12"	0.83	10"	0.77	10"
7.2	108 to 134	9.4		1.63	24"	1.44	18"	1.26	18"	1.17	18"
8.0	134 to 135	10.4		1.70	24"	1.49	18"	1.31	18"	1.21	18"
2.2	144 to 146	2.9		1.05	18"	0.92	12"	0.81	10"	0.75	10"
7.3	146 to 135	9.5		1.64	24"	1.44	18"	1.27	18"	1.17	18"
14.9	135 to 150	19.4		2.15	30"	1.89	24"	1.66	24"	1.53	24"

Note:

1. "cfs" = cubic feet per second.

2. Minimum pipe sizes are calculated using the Manning's equation and are based on the flow rates with 30% factor.

Hydraulic Analysis Report

Project Data

Project Title: 18145 Jamul

Designer: BWC

Project Date: Friday, July 06, 2018

Project Units: U.S. Customary Units

Notes:

Channel Analysis: Pipe 104 to 106

Notes:

Input Parameters

Channel Type: Circular

Pipe Diameter: 1.5000 (ft)

Longitudinal Slope: 0.0050 (ft/ft)

Manning's n: 0.0130

Flow: 1.4000 (cfs)

Result Parameters

Depth: 0.4412 (ft)

Area of Flow: 0.4338 (ft^2)

Wetted Perimeter: 1.7197 (ft)

Hydraulic Radius: 0.2523 (ft)

Average Velocity: 3.2272 (ft/s)

Top Width: 1.3670 (ft)

Froude Number: 1.0095

Critical Depth: 0.4435 (ft)

Critical Velocity: 3.2041 (ft/s)

Critical Slope: 0.0049 (ft/ft)

Critical Top Width: 1.3690 (ft)

Calculated Max Shear Stress: 0.1377 (lb/ft^2)

Calculated Avg Shear Stress: 0.0787 (lb/ft^2)

Channel Analysis: Pipe 124 to 126

Notes:

Input Parameters

Channel Type: Circular

Pipe Diameter: 1.5000 (ft)

Longitudinal Slope: 0.0050 (ft/ft)

Manning's n: 0.0130

Flow: 1.4000 (cfs)

Result Parameters

Depth: 0.4412 (ft)

Area of Flow: 0.4338 (ft^2)

Wetted Perimeter: 1.7197 (ft)

Hydraulic Radius: 0.2523 (ft)

Average Velocity: 3.2272 (ft/s)

Top Width: 1.3670 (ft)

Froude Number: 1.0095

Critical Depth: 0.4435 (ft)

Critical Velocity: 3.2041 (ft/s)

Critical Slope: 0.0049 (ft/ft)

Critical Top Width: 1.3690 (ft)

Calculated Max Shear Stress: 0.1377 (lb/ft^2)

Calculated Avg Shear Stress: 0.0787 (lb/ft^2)

Channel Analysis: Pipe 144 to 146

Notes:

Input Parameters

Channel Type: Circular

Pipe Diameter: 1.5000 (ft)

Longitudinal Slope: 0.0050 (ft/ft)

Manning's n: 0.0130

Flow: 2.2000 (cfs)

Result Parameters

Depth: 0.5595 (ft)

Area of Flow: 0.6009 (ft^2)

Wetted Perimeter: 1.9710 (ft)

Hydraulic Radius: 0.3049 (ft)

Average Velocity: 3.6611 (ft/s)

Top Width: 1.4508 (ft)

Froude Number: 1.0025

Critical Depth: 0.5603 (ft)

Critical Velocity: 3.6539 (ft/s)

Critical Slope: 0.0050 (ft/ft)

Critical Top Width: 1.4512 (ft)

Calculated Max Shear Stress: 0.1746 (lb/ft^2)

Calculated Avg Shear Stress: 0.0951 (lb/ft^2)

Channel Analysis: Pipe 135 to 150

Notes:

Input Parameters

Channel Type: Circular

Pipe Diameter: 2.5000 (ft)

Longitudinal Slope: 0.0050 (ft/ft)

Manning's n: 0.0130

Flow: 14.9000 (cfs)

Result Parameters

Depth: 1.2702 (ft)

Area of Flow: 2.5049 (ft^2)

Wetted Perimeter: 3.9674 (ft)

Hydraulic Radius: 0.6314 (ft)

Average Velocity: 5.9484 (ft/s)

Top Width: 2.4997 (ft)

Froude Number: 1.0472

Critical Depth: 1.3013 (ft)

Critical Velocity: 5.7696 (ft/s)

Critical Slope: 0.0046 (ft/ft)

Critical Top Width: 2.4979 (ft)

Calculated Max Shear Stress: 0.3963 (lb/ft^2)

Calculated Avg Shear Stress: 0.1970 (lb/ft^2)

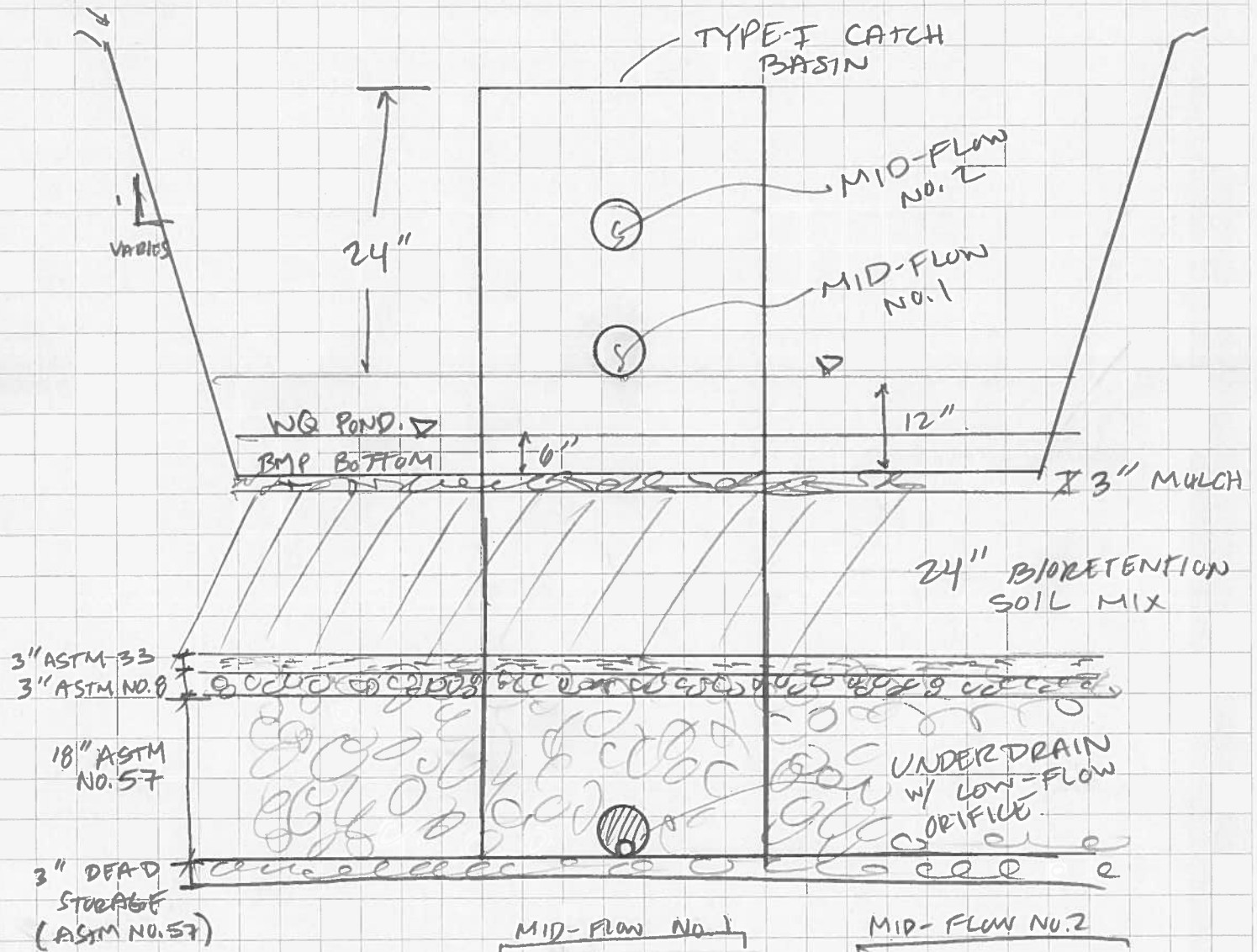
APPENDIX C

Preliminary Detention Analysis

RICK ENGINEERING COMPANY™
5620 Friars Road
San Diego, CA 92110-2596
Tel: (619) 291-0707
Fax: (619) 291-4165

Date 3/26/18
Job No. 18145
Page
Done By HC
Checked By

JAMUL RETAIL CENTER - BMP x-SECT.



BMP I.D	LOW FLOW DIAM (in)	MID-FLOW NO. 1 ELEV (ft)	MID-FLOW NO. 1 DIAM (in)	MID-FLOW NO. 2 ELEV (ft)	MID-FLOW NO. 2 DIAM (in)
BMP 1	0.6875	1.0'	0.6875_{x1}	2.5'	0.75_{x4}
BMP 2	0.6875	1.0'	1.0_{x1}	N/A	N/A
BMP 3	0.5	1.0'	0.5625_{x1}	2.0'	0.5_{x1}

NOTE: ELEVATIONS ARE RELATIVE TO BMP BOTTOM.

```
1*****************************************
 *                                       *
 *   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *
 *               JUN   1998              *
 *            VERSION 4.1                *
 *                                       *
 *  RUN DATE   06JUL18  TIME  09:18:35   *
 *                                       *
 *****************************************
```

```
*****************************************
*                                       *
*    U.S. ARMY CORPS OF ENGINEERS       *
*    HYDROLOGIC ENGINEERING CENTER      *
*          609 SECOND STREET            *
*       DAVIS, CALIFORNIA 95616         *
*           (916) 756-1104              *
*                                       *
*****************************************
```

```
X     X  XXXXXXX   XXXXX          X
X     X  X        X     X        XX
X     X  X        X              X
XXXXXXX  XXXX     X        XXXXX  X
X     X  X        X              X
X     X  X        X     X        X
X     X  XXXXXXX   XXXXX         XXX
```

THIS PROGRAM REPLACES ALL PREVIOUS VERSIONS OF HEC-1 KNOWN AS HEC1 (JAN 73), HEC1GS, HEC1DB, AND HEC1KW.

THE DEFINITIONS OF VARIABLES -RTIMP- AND -RTIOR- HAVE CHANGED FROM THOSE USED WITH THE 1973-STYLE INPUT STRUCTURE.
THE DEFINITION OF -AMSKK- ON RM-CARD WAS CHANGED WITH REVISIONS DATED 28 SEP 81. THIS IS THE FORTRAN77 VERSION
NEW OPTIONS: DAMBREAK OUTFLOW SUBMERGENCE , SINGLE EVENT DAMAGE CALCULATION, DSS:WRITE STAGE FREQUENCY,
DSS:READ TIME SERIES AT DESIRED CALCULATION INTERVAL   LOSS RATE:GREEN AND AMPT INFILTRATION
KINEMATIC WAVE: NEW FINITE DIFFERENCE ALGORITHM

1 HEC-1 INPUT PAGE 1

```
          LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 *** FREE ***
                       *DIAGRAM
              1        ID   JAMUL RETAIL CENTER, J-18145 BIOFILTRATION BASIN, BMP-1
              2        ID   100-YEAR DETENTION ANALYSES - PRELIMINARY ENGINEERING
              3        ID   FEBRUARY 14, 2018 - FILE NAME: JR_B1P1H.HC1
              4        IT       1 01JAN90    1200    1000
              5        IO       5       0

              6        KKBMP1_RatHydro_rev.hc1
              7        KM   RUN DATE   7/5/2018
              8        KM   RATIONAL METHOD HYDROGRAPH PROGRAM
              9        KM   COPYRIGHT 1992, 2014, RICK ENGINEERING COMPANY
             10        KM   6HR RAINFALL IS 3.3 INCHES
             11        KM   RATIONAL METHOD RUNOFF COEFFICIENT IS 0.89
             12        KM   RATIONAL METHOD TIME OF CONCENTRATION IS 6 MIN.
             13        KM   FOR THIS DATA TO RUN PROPERLY THIS IT CARD MUST BE ADDED TO YOUR HEC-1
             14        KM   IT 2 01JAN90 1200 200
             15        BA  0.0055
             16        IN       6 01JAN90    1157
             17        QI       0     0.6     0.6     0.6     0.6     0.7     0.7     0.7     0.7     0.7
             18        QI     0.7     0.7     0.7     0.8     0.8     0.8     0.8     0.9     0.9     0.9
             19        QI     0.9       1       1       1     1.1     1.1     1.1     1.2     1.3     1.3
             20        QI     1.4     1.5     1.6     1.8     1.9     2.2     2.3     2.9     3.2     4.8
             21        QI     6.7    24.1     3.8     2.6       2     1.7     1.5     1.3     1.2     1.1
             22        QI       1     0.9     0.9     0.8     0.8     0.8     0.7     0.7     0.7     0.6
             23        QI     0.6       0       0       0       0       0       0       0       0       0
             24        QI       0       0

             25        KK  DETAIN
             26        KO       0       0       0       0      21
             27        RS       1    STOR      -1
             28        SV       0     0.3
             29        SQ       0     7.3
             30        SE     100     101
             31        ZZ
```

Detention Volume (ac-ft)

1 SCHEMATIC DIAGRAM OF STREAM NETWORK

```
 INPUT
  LINE      (V) ROUTING          (--->) DIVERSION OR PUMP FLOW

    NO.     (.) CONNECTOR        (<---) RETURN OF DIVERTED OR PUMPED FLOW

      6    BMP1_Rat
                V
                V
     25      DETAIN

  (***) RUNOFF ALSO COMPUTED AT THIS LOCATION
```


```
1*****************************************
 *                                       *
 *   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *
 *               JUN   1998              *
 *            VERSION 4.1                *
 *                                       *
 *  RUN DATE   06JUL18  TIME  09:18:35   *
 *                                       *
 *****************************************
```

```
*****************************************
*                                       *
*    U.S. ARMY CORPS OF ENGINEERS       *
*    HYDROLOGIC ENGINEERING CENTER      *
*          609 SECOND STREET            *
*       DAVIS, CALIFORNIA 95616         *
*           (916) 756-1104              *
*                                       *
*****************************************
```

JAMUL RETAIL CENTER, J-18145 BIOFILTRATION BASIN, BMP-1
100-YEAR DETENTION ANALYSES - PRELIMINARY ENGINEERING
FEBRUARY 14, 2018 - FILE NAME: JR_B1P1H.HC1

```
  5 IO          OUTPUT CONTROL VARIABLES
                      IPRNT           5  PRINT CONTROL
                      IPLOT           0  PLOT CONTROL
                      QSCAL          0.  HYDROGRAPH PLOT SCALE

    IT          HYDROGRAPH TIME DATA
                       NMIN           1  MINUTES IN COMPUTATION INTERVAL
                      IDATE      1JAN90  STARTING DATE
                      ITIME        1200  STARTING TIME
                         NQ        1000  NUMBER OF HYDROGRAPH ORDINATES
                     NDDATE      2JAN90  ENDING DATE
                     NDTIME        0439  ENDING TIME
                     ICENT          19  CENTURY MARK

                  COMPUTATION INTERVAL     .02 HOURS
                       TOTAL TIME BASE   16.65 HOURS

        ENGLISH UNITS
             DRAINAGE AREA         SQUARE MILES
             PRECIPITATION DEPTH   INCHES
             LENGTH, ELEVATION     FEET
             FLOW                  CUBIC FEET PER SECOND
             STORAGE VOLUME        ACRE-FEET
             SURFACE AREA          ACRES
             TEMPERATURE           DEGREES FAHRENHEIT


*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***


            **************
            *            *
  25 KK     *    DETAIN  *
            *            *
            **************

  26 KO          OUTPUT CONTROL VARIABLES
                      IPRNT           5  PRINT CONTROL
                      IPLOT           0  PLOT CONTROL
                      QSCAL          0.  HYDROGRAPH PLOT SCALE
                      IPNCH           0  PUNCH COMPUTED HYDROGRAPH
                       IOUT          21  SAVE HYDROGRAPH ON THIS UNIT
                      ISAV1           1  FIRST ORDINATE PUNCHED OR SAVED
                      ISAV2        1000  LAST ORDINATE PUNCHED OR SAVED
                     TIMINT        .017  TIME INTERVAL IN HOURS

1
                                        RUNOFF SUMMARY
                                    FLOW IN CUBIC FEET PER SECOND
                                  TIME IN HOURS,  AREA IN SQUARE MILES

                                    PEAK   TIME OF     AVERAGE FLOW FOR MAXIMUM PERIOD       BASIN     MAXIMUM     TIME OF
          OPERATION       STATION   FLOW     PEAK      6-HOUR     24-HOUR     72-HOUR        AREA      STAGE     MAX STAGE
+
          HYDROGRAPH AT
+                       BMP1_Rat      24.     4.05          2.          1.          1.         .01
          ROUTED TO
+                         DETAIN       7.     4.13          2.          1.          1.         .01
+                                                                                                    100.94        4.13


 *** NORMAL END OF HEC-1 ***
```

Lag time = 4.13 - 4.05 hrs
= 0.08 hrs

Peak Discharge Rate
(from BMP 1)

DETAIN 11200 1JAN90 0 1 11000 .005

.300	.302	.307	.315	.324	.333	.342	.350	.359	.367
.374	.382	.389	.396	.403	.409	.415	.421	.427	.433
.439	.444	.449	.455	.461	.468	.475	.482	.489	.496
.503	.509	.515	.521	.527	.533	.539	.544	.549	.554
.559	.563	.568	.572	.577	.581	.585	.588	.592	.596
.599	.602	.606	.609	.612	.615	.617	.620	.623	.625
.628	.630	.632	.635	.637	.639	.641	.643	.645	.647
.649	.651	.654	.658	.661	.666	.670	.674	.679	.683
.686	.690	.694	.697	.701	.704	.707	.710	.713	.716
.719	.721	.724	.727	.729	.732	.736	.740	.744	.749
.754	.759	.764	.768	.773	.777	.781	.785	.789	.792
.796	.799	.803	.806	.809	.812	.815	.818	.821	.824
.828	.832	.837	.842	.847	.852	.857	.862	.866	.871
.875	.879	.883	.887	.891	.894	.898	.902	.907	.912
.917	.923	.929	.934	.940	.945	.950	.955	.960	.965
.969	.973	.978	.982	.986	.990	.995	1.001	1.006	1.013
1.019	1.026	1.033	1.040	1.048	1.056	1.064	1.072	1.079	1.087
1.094	1.101	1.107	1.115	1.122	1.130	1.138	1.146	1.155	1.164
1.173	1.182	1.192	1.202	1.212	1.222	1.233	1.244	1.255	1.266
1.277	1.290	1.302	1.316	1.330	1.345	1.361	1.376	1.391	1.407
1.422	1.438	1.454	1.471	1.489	1.508	1.529	1.550	1.572	1.593
1.615	1.636	1.657	1.678	1.700	1.725	1.752	1.782	1.813	1.848
1.883	1.919	1.956	1.993	2.030	2.068	2.109	2.158	2.215	2.278
2.348	2.424	2.508	2.599	2.698	2.804	2.916	3.036	3.204	3.463
3.809	4.239	4.750	5.340	5.903	6.335	6.642	6.827	6.895	6.848
6.745	6.638	6.528	6.415	6.299	6.180	6.061	5.942	5.823	5.705
5.588	5.472	5.356	5.243	5.132	5.023	4.916	4.811	4.708	4.607
4.508	4.412	4.318	4.225	4.135	4.046	3.960	3.875	3.792	3.710
3.630	3.553	3.477	3.403	3.331	3.261	3.193	3.127	3.062	2.999
2.937	2.877	2.818	2.760	2.704	2.649	2.596	2.543	2.492	2.442
2.393	2.346	2.299	2.253	2.208	2.165	2.123	2.083	2.044	2.006
1.970	1.934	1.898	1.863	1.829	1.795	1.763	1.731	1.700	1.670
1.642	1.614	1.587	1.561	1.536	1.512	1.488	1.466	1.444	1.421
1.400	1.378	1.356	1.335	1.314	1.294	1.274	1.255	1.237	1.219
1.202	1.186	1.170	1.154	1.139	1.125	1.110	1.096	1.082	1.067
1.053	1.038	1.024	1.010	.996	.983	.970	.958	.945	.928
.909	.888	.863	.836	.809	.782	.756	.732	.707	.684
.662	.640	.619	.598	.579	.559	.541	.523	.506	.489
.473	.458	.442	.428	.414	.400	.387	.374	.362	.350
.338	.327	.316	.306	.296	.286	.277	.268	.259	.250
.242	.234	.226	.219	.212	.205	.198	.191	.185	.179
.173	.167	.162	.157	.151	.146	.142	.137	.132	.128
.124	.120	.116	.112	.108	.105	.101	.098	.095	.092
.089	.086	.083	.080	.077	.075	.072	.070	.068	.065
.063	.061	.059	.057	.055	.054	.052	.050	.048	.047
.045	.044	.042	.041	.040	.038	.037	.036	.035	.033
.032	.031	.030	.029	.028	.027	.026	.026	.025	.024
.023	.022	.022	.021	.020	.020	.019	.018	.018	.017
.017	.016	.015	.015	.014	.014	.014	.013	.013	.012
.012	.011	.011	.011	.010	.010	.010	.009	.009	.009
.008	.008	.008	.008	.007	.007	.007	.007	.006	.006
.006	.006	.006	.005	.005	.005	.005	.005	.005	.004
.004	.004	.004	.004	.004	.004	.004	.003	.003	.003
.003	.003	.003	.003	.003	.003	.003	.002	.002	.002
.002	.002	.002	.002	.002	.002	.002	.002	.002	.002
.002	.002	.001	.001	.001	.001	.001	.001	.001	.001
.001	.001	.001	.001	.001	.001	.001	.001	.001	.001
.001	.001	.001	.001	.001	.001	.001	.001	.001	.001
.001	.001	.001	.001	.001	.000	.000	.000	.000	.000
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.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
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.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
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1*****************************************
 *                                       *
 *   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *
 *               JUN   1998              *
 *            VERSION 4.1                *
 *                                       *
 *  RUN DATE   06JUL18  TIME  09:20:21   *
 *                                       *
 *****************************************
```

```
*****************************************
*                                       *
*    U.S. ARMY CORPS OF ENGINEERS       *
*    HYDROLOGIC ENGINEERING CENTER      *
*          609 SECOND STREET            *
*       DAVIS, CALIFORNIA 95616         *
*           (916) 756-1104              *
*                                       *
*****************************************
```

```
X     X  XXXXXXX   XXXXX          X
X     X  X        X     X        XX
X     X  X        X              X
XXXXXXX  XXXX     X        XXXXX  X
X     X  X        X              X
X     X  X        X     X        X
X     X  XXXXXXX   XXXXX         XXX
```

THIS PROGRAM REPLACES ALL PREVIOUS VERSIONS OF HEC-1 KNOWN AS HEC1 (JAN 73), HEC1GS, HEC1DB, AND HEC1KW.

THE DEFINITIONS OF VARIABLES -RTIMP- AND -RTIOR- HAVE CHANGED FROM THOSE USED WITH THE 1973-STYLE INPUT STRUCTURE.
THE DEFINITION OF -AMSKK- ON RM-CARD WAS CHANGED WITH REVISIONS DATED 28 SEP 81. THIS IS THE FORTRAN77 VERSION
NEW OPTIONS: DAMBREAK OUTFLOW SUBMERGENCE , SINGLE EVENT DAMAGE CALCULATION, DSS:WRITE STAGE FREQUENCY,
DSS:READ TIME SERIES AT DESIRED CALCULATION INTERVAL   LOSS RATE:GREEN AND AMPT INFILTRATION
KINEMATIC WAVE: NEW FINITE DIFFERENCE ALGORITHM

1 HEC-1 INPUT PAGE 1

```
          LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 *** FREE ***
                       *DIAGRAM
              1        ID   JAMUL RETAIL CENTER, J-18145 BIOFILTRATION BASIN, BMP-2
              2        ID   100-YEAR DETENTION ANALYSES - PRELIMINARY ENGINEERING
              3        ID   FEBRUARY 14, 2018 - FILE NAME: JR_B2P1H.HC1
              4        IT       1 01JAN90    1200    1000
              5        IO       5       0

              6        KKBMP2_RatHydro.hc1
              7        KM   RUN DATE   7/3/2018
              8        KM   RATIONAL METHOD HYDROGRAPH PROGRAM
              9        KM   COPYRIGHT 1992, 2014, RICK ENGINEERING COMPANY
             10        KM   6HR RAINFALL IS 3.3 INCHES
             11        KM   RATIONAL METHOD RUNOFF COEFFICIENT IS 0.83
             12        KM   RATIONAL METHOD TIME OF CONCENTRATION IS 6 MIN.
             13        KM   FOR THIS DATA TO RUN PROPERLY THIS IT CARD MUST BE ADDED TO YOUR HEC-1
             14        KM   IT 2 01JAN90 1200 200
             15        BA  0.0038
             16        IN       6 01JAN90    1157
             17        QI       0     0.4     0.4     0.4     0.4     0.4     0.4     0.4     0.5
             18        QI     0.5     0.5     0.5     0.5     0.5     0.5     0.5     0.6     0.6
             19        QI     0.6     0.6     0.6     0.7     0.7     0.7     0.8     0.8     0.9
             20        QI     0.9       1       1     1.1     1.2     1.4     1.5     1.8     2.1       3
             21        QI     3.8    15.9     2.4     1.6     1.3     1.1     0.9     0.8     0.8     0.7
             22        QI     0.6     0.6     0.6     0.5     0.5     0.5     0.5     0.4     0.4     0.4
             23        QI     0.4       0       0       0       0       0       0       0       0       0
             24        QI       0       0

             25        KK  DETAIN
             26        KO       0       0       0       0      21
             27        RS       1    STOR      -1
             28        SV       0    0.18
             29        SQ       0     4.7
             30        SE     100     101
             31        ZZ
```

Detention Volume (ac-ft)

1 SCHEMATIC DIAGRAM OF STREAM NETWORK

```
 INPUT
  LINE      (V) ROUTING          (--->) DIVERSION OR PUMP FLOW

    NO.     (.) CONNECTOR        (<---) RETURN OF DIVERTED OR PUMPED FLOW

      6    BMP2_Rat
                V
                V
     25      DETAIN

  (***) RUNOFF ALSO COMPUTED AT THIS LOCATION
```


```
1*****************************************
 *                                       *
 *   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *
 *               JUN   1998              *
 *            VERSION 4.1                *
 *                                       *
 *  RUN DATE   06JUL18  TIME  09:20:21   *
 *                                       *
 *****************************************
```

```
*****************************************
*                                       *
*    U.S. ARMY CORPS OF ENGINEERS       *
*    HYDROLOGIC ENGINEERING CENTER      *
*          609 SECOND STREET            *
*       DAVIS, CALIFORNIA 95616         *
*           (916) 756-1104              *
*                                       *
*****************************************
```

JAMUL RETAIL CENTER, J-18145 BIOFILTRATION BASIN, BMP-2
100-YEAR DETENTION ANALYSES - PRELIMINARY ENGINEERING
FEBRUARY 14, 2018 - FILE NAME: JR_B2P1H.HC1

```
    5 IO          OUTPUT CONTROL VARIABLES
                        IPRNT           5  PRINT CONTROL
                        IPLOT           0  PLOT CONTROL
                        QSCAL          0.  HYDROGRAPH PLOT SCALE

      IT          HYDROGRAPH TIME DATA
                         NMIN           1  MINUTES IN COMPUTATION INTERVAL
                        IDATE      1JAN90  STARTING DATE
                        ITIME        1200  STARTING TIME
                           NQ        1000  NUMBER OF HYDROGRAPH ORDINATES
                       NDDATE      2JAN90  ENDING DATE
                       NDTIME        0439  ENDING TIME
                       ICENT          19  CENTURY MARK

                    COMPUTATION INTERVAL     .02 HOURS
                         TOTAL TIME BASE   16.65 HOURS

           ENGLISH UNITS
                DRAINAGE AREA         SQUARE MILES
                PRECIPITATION DEPTH   INCHES
                LENGTH, ELEVATION     FEET
                FLOW                  CUBIC FEET PER SECOND
                STORAGE VOLUME        ACRE-FEET
                SURFACE AREA          ACRES
                TEMPERATURE           DEGREES FAHRENHEIT


 *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***


              **************
              *            *
   25 KK      *    DETAIN  *
              *            *
              **************

   26 KO          OUTPUT CONTROL VARIABLES
                        IPRNT           5  PRINT CONTROL
                        IPLOT           0  PLOT CONTROL
                        QSCAL          0.  HYDROGRAPH PLOT SCALE
                        IPNCH           0  PUNCH COMPUTED HYDROGRAPH
                         IOUT          21  SAVE HYDROGRAPH ON THIS UNIT
                        ISAV1           1  FIRST ORDINATE PUNCHED OR SAVED
                        ISAV2        1000  LAST ORDINATE PUNCHED OR SAVED
                       TIMINT        .017  TIME INTERVAL IN HOURS

1
                                                RUNOFF SUMMARY
                                           FLOW IN CUBIC FEET PER SECOND
                                         TIME IN HOURS,  AREA IN SQUARE MILES

                                    PEAK    TIME OF     AVERAGE FLOW FOR MAXIMUM PERIOD       BASIN      MAXIMUM      TIME OF
          OPERATION       STATION   FLOW      PEAK       6-HOUR     24-HOUR     72-HOUR       AREA       STAGE      MAX STAGE
+
          HYDROGRAPH AT
+                         BMP2_Rat    16.     4.05          1.          0.          0.        .00
          ROUTED TO
+                          DETAIN      5.     4.13          1.          0.          0.        .00
+                                                                                              100.98        4.13


 *** NORMAL END OF HEC-1 ***
```

Lag time = 4.13 - 4.05 hrs
= 0.08 hrs

Peak Discharge Rate
(from BMP 2)

DETAIN 11200 1JAN90 0 1 11000 .004

.200	.201	.205	.210	.217	.224	.230	.236	.242	.247
.253	.258	.263	.268	.272	.277	.281	.285	.289	.293
.297	.301	.304	.308	.311	.314	.317	.320	.323	.326
.328	.331	.333	.336	.338	.340	.342	.344	.346	.348
.350	.352	.353	.355	.357	.358	.360	.362	.365	.368
.372	.376	.381	.385	.389	.393	.397	.400	.404	.407
.411	.414	.417	.420	.423	.425	.428	.430	.433	.435
.438	.440	.442	.444	.446	.448	.450	.451	.453	.455
.456	.458	.459	.461	.462	.464	.465	.466	.467	.468
.470	.471	.472	.473	.474	.475	.475	.476	.477	.478
.479	.481	.483	.486	.489	.492	.496	.500	.503	.507
.510	.513	.516	.519	.522	.525	.528	.530	.533	.535
.537	.539	.542	.544	.546	.548	.549	.551	.553	.555
.556	.559	.562	.565	.569	.573	.578	.582	.586	.590
.594	.598	.602	.605	.608	.612	.615	.618	.621	.624
.626	.629	.631	.634	.636	.640	.643	.647	.652	.657
.662	.667	.671	.676	.680	.684	.689	.694	.699	.705
.711	.717	.723	.730	.736	.741	.747	.752	.758	.764
.770	.777	.784	.791	.799	.806	.813	.819	.826	.832
.838	.845	.852	.859	.866	.874	.883	.891	.900	.909
.919	.928	.938	.949	.961	.974	.987	1.001	1.015	1.030
1.044	1.059	1.074	1.089	1.104	1.121	1.138	1.157	1.177	1.199
1.221	1.244	1.268	1.293	1.319	1.345	1.375	1.408	1.446	1.488
1.533	1.582	1.635	1.690	1.748	1.809	1.872	1.938	2.039	2.208
2.443	2.740	3.098	3.515	3.913	4.217	4.431	4.558	4.601	4.563
4.484	4.403	4.321	4.237	4.150	4.063	3.975	3.888	3.803	3.719
3.636	3.555	3.474	3.396	3.319	3.243	3.169	3.097	3.026	2.956
2.887	2.820	2.754	2.689	2.626	2.564	2.503	2.445	2.388	2.332
2.278	2.225	2.175	2.126	2.080	2.034	1.990	1.948	1.906	1.864
1.824	1.785	1.746	1.708	1.671	1.635	1.599	1.564	1.530	1.497
1.466	1.435	1.405	1.377	1.350	1.323	1.297	1.273	1.249	1.226
1.204	1.182	1.160	1.138	1.116	1.095	1.074	1.053	1.034	1.015
.997	.979	.962	.946	.930	.915	.900	.886	.872	.859
.847	.834	.823	.811	.800	.788	.777	.765	.753	.741
.729	.717	.706	.695	.685	.675	.665	.656	.646	.638
.629	.621	.613	.606	.599	.592	.585	.578	.571	.561
.550	.536	.521	.504	.486	.469	.452	.436	.421	.406
.391	.378	.364	.351	.339	.327	.315	.304	.294	.283
.273	.264	.254	.245	.237	.228	.220	.212	.205	.198
.191	.184	.177	.171	.165	.159	.154	.148	.143	.138
.133	.128	.124	.119	.115	.111	.107	.103	.100	.096
.093	.090	.086	.083	.080	.078	.075	.072	.070	.067
.065	.063	.060	.058	.056	.054	.052	.050	.049	.047
.045	.044	.042	.041	.039	.038	.036	.035	.034	.033
.032	.030	.029	.028	.027	.026	.025	.025	.024	.023
.022	.021	.020	.020	.019	.018	.018	.017	.017	.016
.015	.015	.014	.014	.013	.013	.012	.012	.012	.011
.011	.010	.010	.010	.009	.009	.009	.008	.008	.008
.007	.007	.007	.007	.006	.006	.006	.006	.006	.005
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1*****************************************                     *****************************************
 *                                       *                     *                                       *
 *   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *                     *   U.S. ARMY CORPS OF ENGINEERS        *
 *              JUN   1998               *                     *   HYDROLOGIC ENGINEERING CENTER       *
 *           VERSION 4.1                 *                     *         609 SECOND STREET             *
 *                                       *                     *      DAVIS, CALIFORNIA 95616          *
 * RUN DATE   06JUL18  TIME  09:57:21    *                     *          (916) 756-1104               *
 *                                       *                     *                                       *
 *****************************************                     *****************************************


                                   X     X  XXXXXXX   XXXXX           X
                                   X     X  X        X     X         XX
                                   X     X  X        X                X
                                   XXXXXXX  XXXX     X        XXXXX   X
                                   X     X  X        X                X
                                   X     X  X        X     X          X
                                   X     X  XXXXXXX   XXXXX          XXX


          THIS PROGRAM REPLACES ALL PREVIOUS VERSIONS OF HEC-1 KNOWN AS HEC1 (JAN 73), HEC1GS, HEC1DB, AND HEC1KW.

          THE DEFINITIONS OF VARIABLES -RTIMP- AND -RTIOR- HAVE CHANGED FROM THOSE USED WITH THE 1973-STYLE INPUT STRUCTURE.
          THE DEFINITION OF -AMSKK- ON RM-CARD WAS CHANGED WITH REVISIONS DATED 28 SEP 81. THIS IS THE FORTRAN77 VERSION
          NEW OPTIONS: DAMBREAK OUTFLOW SUBMERGENCE , SINGLE EVENT DAMAGE CALCULATION, DSS:WRITE STAGE FREQUENCY,
          DSS:READ TIME SERIES AT DESIRED CALCULATION INTERVAL   LOSS RATE:GREEN AND AMPT INFILTRATION
          KINEMATIC WAVE: NEW FINITE DIFFERENCE ALGORITHM


1                                                   HEC-1 INPUT                                                  PAGE  1

         LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 *** FREE ***
                       *DIAGRAM
            1          ID    JAMUL RETAIL CENTER, J-18145 BIOFILTRATION BASIN, BMP-3
            2          ID    100-YEAR DETENTION ANALYSES - PRELIMINARY ENGINEERING
            3          ID    FEBRUARY 14, 2018 - FILE NAME: JR_B3P1H.HC1
            4          IT        1 01JAN90    1200    1000
            5          IO        5       0

            6          KKBMP3_RatHydro.hc1
            7          KM    RUN DATE   7/3/2018
            8          KM    RATIONAL METHOD HYDROGRAPH PROGRAM
            9          KM    COPYRIGHT 1992, 2014, RICK ENGINEERING COMPANY
           10          KM    6HR RAINFALL IS 3.3 INCHES
           11          KM    RATIONAL METHOD RUNOFF COEFFICIENT IS 0.68
           12          KM    RATIONAL METHOD TIME OF CONCENTRATION IS 6 MIN.
           13          KM    FOR THIS DATA TO RUN PROPERLY THIS IT CARD MUST BE ADDED TO YOUR HEC-1
           14          KM    IT 2 01JAN90 1200 200
           15          BA    0.002
           16          IN        6 01JAN90    1157
           17          QI        0     0.2     0.2     0.2     0.2     0.2     0.2     0.2     0.2     0.2
           18          QI      0.2     0.2     0.2     0.2     0.2     0.2     0.2     0.2     0.2     0.3
           19          QI      0.3     0.3     0.3     0.3     0.3     0.3     0.3     0.3     0.4     0.4
           20          QI      0.4     0.4     0.5     0.5     0.5     0.6     0.7     0.8     0.9     1.4
           21          QI      1.8     6.9     1.1     0.7     0.6     0.5     0.4     0.4     0.3     0.3
           22          QI      0.3     0.3     0.3     0.2     0.2     0.2     0.2     0.2     0.2     0.2
           23          QI      0.2       0       0       0       0       0       0       0       0       0
           24          QI        0       0

           25          KK  DETAIN
           26          KO        0       0       0       0      21
           27          RS        1    STOR      -1
           28          SV        0    0.07
           29          SQ        0     2.4
           30          SE      100     101
           31          ZZ
```

Detention Volume (ac-ft)

```
1
                  SCHEMATIC DIAGRAM OF STREAM NETWORK
 INPUT
  LINE     (V) ROUTING          (--->) DIVERSION OR PUMP FLOW

   NO.     (.) CONNECTOR        (<---) RETURN OF DIVERTED OR PUMPED FLOW

    6   BMP3_Rat
               V
               V
   25     DETAIN

 (***) RUNOFF ALSO COMPUTED AT THIS LOCATION
```


```
1*****************************************                     *****************************************
 *                                       *                     *                                       *
 *   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *                     *   U.S. ARMY CORPS OF ENGINEERS        *
 *              JUN   1998               *                     *   HYDROLOGIC ENGINEERING CENTER       *
 *           VERSION 4.1                 *                     *         609 SECOND STREET             *
 *                                       *                     *      DAVIS, CALIFORNIA 95616          *
 * RUN DATE   06JUL18  TIME  09:57:21    *                     *          (916) 756-1104               *
 *                                       *                     *                                       *
 *****************************************                     *****************************************
```

JAMUL RETAIL CENTER, J-18145 BIOFILTRATION BASIN, BMP-3
100-YEAR DETENTION ANALYSES - PRELIMINARY ENGINEERING
FEBRUARY 14, 2018 - FILE NAME: JR_B3P1H.HC1

```
    5 IO          OUTPUT CONTROL VARIABLES
                        IPRNT           5  PRINT CONTROL
                        IPLOT           0  PLOT CONTROL
                        QSCAL          0.  HYDROGRAPH PLOT SCALE

      IT          HYDROGRAPH TIME DATA
                         NMIN           1  MINUTES IN COMPUTATION INTERVAL
                        IDATE      1JAN90  STARTING DATE
                        ITIME        1200  STARTING TIME
                           NQ        1000  NUMBER OF HYDROGRAPH ORDINATES
                       NDDATE      2JAN90  ENDING DATE
                       NDTIME        0439  ENDING TIME
                       ICENT          19  CENTURY MARK

                    COMPUTATION INTERVAL     .02 HOURS
                         TOTAL TIME BASE   16.65 HOURS

           ENGLISH UNITS
                DRAINAGE AREA         SQUARE MILES
                PRECIPITATION DEPTH   INCHES
                LENGTH, ELEVATION     FEET
                FLOW                  CUBIC FEET PER SECOND
                STORAGE VOLUME        ACRE-FEET
                SURFACE AREA          ACRES
                TEMPERATURE           DEGREES FAHRENHEIT


 *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***


              **************
              *            *
   25 KK      *    DETAIN  *
              *            *
              **************

   26 KO          OUTPUT CONTROL VARIABLES
                        IPRNT           5  PRINT CONTROL
                        IPLOT           0  PLOT CONTROL
                        QSCAL          0.  HYDROGRAPH PLOT SCALE
                        IPNCH           0  PUNCH COMPUTED HYDROGRAPH
                         IOUT          21  SAVE HYDROGRAPH ON THIS UNIT
                        ISAV1           1  FIRST ORDINATE PUNCHED OR SAVED
                        ISAV2        1000  LAST ORDINATE PUNCHED OR SAVED
                       TIMINT        .017  TIME INTERVAL IN HOURS

1
                                                RUNOFF SUMMARY
                                           FLOW IN CUBIC FEET PER SECOND
                                         TIME IN HOURS,  AREA IN SQUARE MILES

                                                PEAK    TIME OF     AVERAGE FLOW FOR MAXIMUM PERIOD       BASIN      MAXIMUM      TIME OF
          OPERATION       STATION               FLOW     PEAK      6-HOUR     24-HOUR     72-HOUR        AREA       STAGE      MAX STAGE
+
          HYDROGRAPH AT
+                         BMP3_Rat              7.     4.05          0.          0.          0.         .00
          ROUTED TO
+                          DETAIN               2.     4.13          0.          0.          0.         .00
+                                                                                                                  100.99         4.13


 *** NORMAL END OF HEC-1 ***
```

Lag time = 4.13 - 4.05 hrs
= 0.08 hrs

Peak Discharge Rate
(from BMP 3)

DETAIN 11200 1JAN90 0 1 11000 .002

.100	.101	.103	.107	.111	.115	.119	.123	.126	.130
.133	.136	.139	.142	.145	.147	.150	.152	.154	.156
.158	.160	.162	.164	.165	.167	.169	.170	.171	.173
.174	.175	.176	.177	.178	.179	.180	.181	.182	.183
.184	.185	.185	.186	.187	.187	.188	.188	.189	.189
.190	.190	.191	.191	.192	.192	.192	.193	.193	.193
.194	.194	.194	.195	.195	.195	.195	.195	.196	.196
.196	.196	.196	.197	.197	.197	.197	.197	.197	.197
.198	.198	.198	.198	.198	.198	.198	.198	.198	.198
.198	.199	.199	.199	.199	.199	.199	.199	.199	.199
.199	.199	.199	.199	.199	.199	.200	.201	.203	.205
.209	.212	.216	.220	.224	.227	.231	.234	.237	.240
.243	.245	.248	.250	.253	.255	.257	.259	.261	.263
.264	.266	.267	.269	.270	.272	.273	.274	.276	.277
.278	.279	.280	.281	.282	.282	.283	.284	.285	.285
.286	.287	.287	.288	.288	.289	.290	.290	.290	.291
.292	.293	.295	.298	.302	.306	.310	.315	.318	.322
.326	.329	.333	.336	.339	.341	.344	.347	.349	.352
.354	.356	.358	.360	.362	.365	.369	.373	.377	.383
.388	.393	.398	.403	.407	.412	.416	.420	.423	.427
.430	.433	.437	.441	.446	.451	.457	.463	.469	.477
.484	.492	.501	.510	.519	.528	.538	.548	.559	.569
.580	.592	.603	.615	.627	.639	.653	.670	.691	.714
.740	.768	.799	.831	.865	.901	.937	.976	1.033	1.128
1.257	1.419	1.613	1.837	2.049	2.205	2.311	2.366	2.375	2.338
2.280	2.220	2.161	2.101	2.041	1.981	1.922	1.864	1.808	1.755
1.702	1.652	1.603	1.556	1.510	1.465	1.422	1.379	1.338	1.299
1.260	1.222	1.185	1.150	1.115	1.082	1.050	1.020	.992	.965
.938	.912	.887	.861	.837	.812	.789	.766	.745	.724
.705	.686	.668	.651	.635	.619	.605	.591	.577	.564
.552	.541	.530	.519	.509	.499	.490	.481	.473	.465
.457	.449	.440	.431	.421	.411	.402	.392	.383	.375
.367	.359	.352	.345	.338	.332	.326	.320	.314	.309
.304	.299	.295	.290	.286	.282	.278	.275	.271	.268
.265	.262	.259	.256	.254	.251	.249	.247	.244	.242
.240	.239	.237	.235	.233	.232	.230	.229	.227	.223
.218	.212	.205	.196	.187	.178	.170	.162	.155	.148
.141	.134	.128	.122	.117	.111	.106	.101	.097	.092
.088	.084	.080	.076	.073	.069	.066	.063	.060	.057
.055	.052	.050	.048	.045	.043	.041	.039	.038	.036
.034	.033	.031	.030	.028	.027	.026	.025	.023	.022
.021	.020	.019	.018	.018	.017	.016	.015	.015	.014
.013	.013	.012	.012	.011	.010	.010	.010	.009	.009
.008	.008	.008	.007	.007	.007	.006	.006	.006	.005
.005	.005	.005	.004	.004	.004	.004	.004	.004	.003
.003	.003	.003	.003	.003	.003	.002	.002	.002	.002
.002	.002	.002	.002	.002	.002	.002	.001	.001	.001
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.000	.000	.000	.000	.000	.000	.000	.000	.000	.000

.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
.000	.000	.000	.000	.000	.000	.000	.000	.000	.000

APPENDIX D

FEMA - FIRM

NOTES TO USERS

This map is for use in administering the National Flood Insurance Program. It does not necessarily identify all areas subject to flooding, particularly from local drainage sources of small size. The **community map repository** should be consulted for possible updated or additional flood hazard information.

To obtain more detailed information in areas where **Base Flood Elevations** (BFEs) and/or **floodways** have been determined, users are encouraged to consult the Flood Profiles and Floodway Data and/or Summary of Stillwater Elevations tables contained within the Flood Insurance Study (FIS) report that accompanies this FIRM. Users should be aware that BFEs shown on the FIRM represent rounded whole-foot elevations. These BFEs are intended for flood insurance rating purposes only and should not be used as the sole source of flood elevation information. Accordingly, flood elevation data presented in the FIS report should be utilized in conjunction with the FIRM for purposes of construction and/or floodplain management.

Coastal Base Flood Elevations (BFEs) shown on this map apply only landward of 0.0' North American Vertical Datum of 1988 (NAVD 88). Users of this FIRM should be aware that coastal flood elevations are also provided in the Summary of Stillwater Elevations table in the Flood Insurance Study report for this jurisdiction. Elevations shown in the Summary of Stillwater Elevations table should be used for construction and/or floodplain management purposes when they are higher than the elevations shown on this FIRM.

Boundaries of the **floodways** were computed at cross sections and interpolated between cross sections. The floodways were based on hydraulic considerations with regard to requirements of the National Flood Insurance Program. Floodway widths and other pertinent floodway data are provided in the Flood Insurance Study report for this jurisdiction.

Certain areas not in Special Flood Hazard Areas may be protected by **flood control structures**. Refer to Section 2.4 "Flood Protection Measures" of the Flood Insurance Study report for information on flood control structures for this jurisdiction.

The **projection** used in the preparation of this map was Universal Transverse Mercator (UTM) Zone 11. The **horizontal datum** was NAD83, GRS1980 spheroid. Differences in datum, spheroid, projection or UTM zones used in the production of FIRMs for adjacent jurisdictions may result in slight positional differences in map features across jurisdiction boundaries. These differences do not affect the accuracy of this FIRM.

Flood elevations on this map are referenced to the North American Vertical Datum of 1988. These flood elevations must be compared to structure and ground elevations referenced to the same **vertical datum**. For information regarding conversion between the National Geodetic Vertical Datum of 1929 and the North American Vertical Datum of 1988, visit the National Geodetic Survey website at http://www.ngs.noaa.gov/ or contact the National Geodetic Survey at the following address:

NGS Information Services
NOAA, N/NGS12
National Geodetic Survey
SSMC-3, #9202
1315 East-West Highway
Silver Spring, Maryland 20910-3282
(301) 713-3242

To obtain current elevation, description, and/or location information for **bench marks** shown on this map, please contact the Information Services Branch of the National Geodetic Survey at **(301) 713-3242** or visit its website at http://www.ngs.noaa.gov/.

Base map information shown on this FIRM was provided in digital format by the USDA National Agriculture Imagery Program (NAIP). this information was photogrammetrically compiled at a scale of 1:24,000 from aerial photography dated 2009.

This map reflects more detailed and up-to-date **stream channel configurations** than those shown on the previous FIRM for this jurisdiction. The floodplains and floodways that were transferred from the previous FIRM may have been adjusted to conform to these new stream channel configurations. As a result, the Flood Profiles and Floodway Data tables *in the Flood Insurance Study report (which contains authoritative hydraulic data)* may reflect stream channel distances that differ from what is shown on this map.

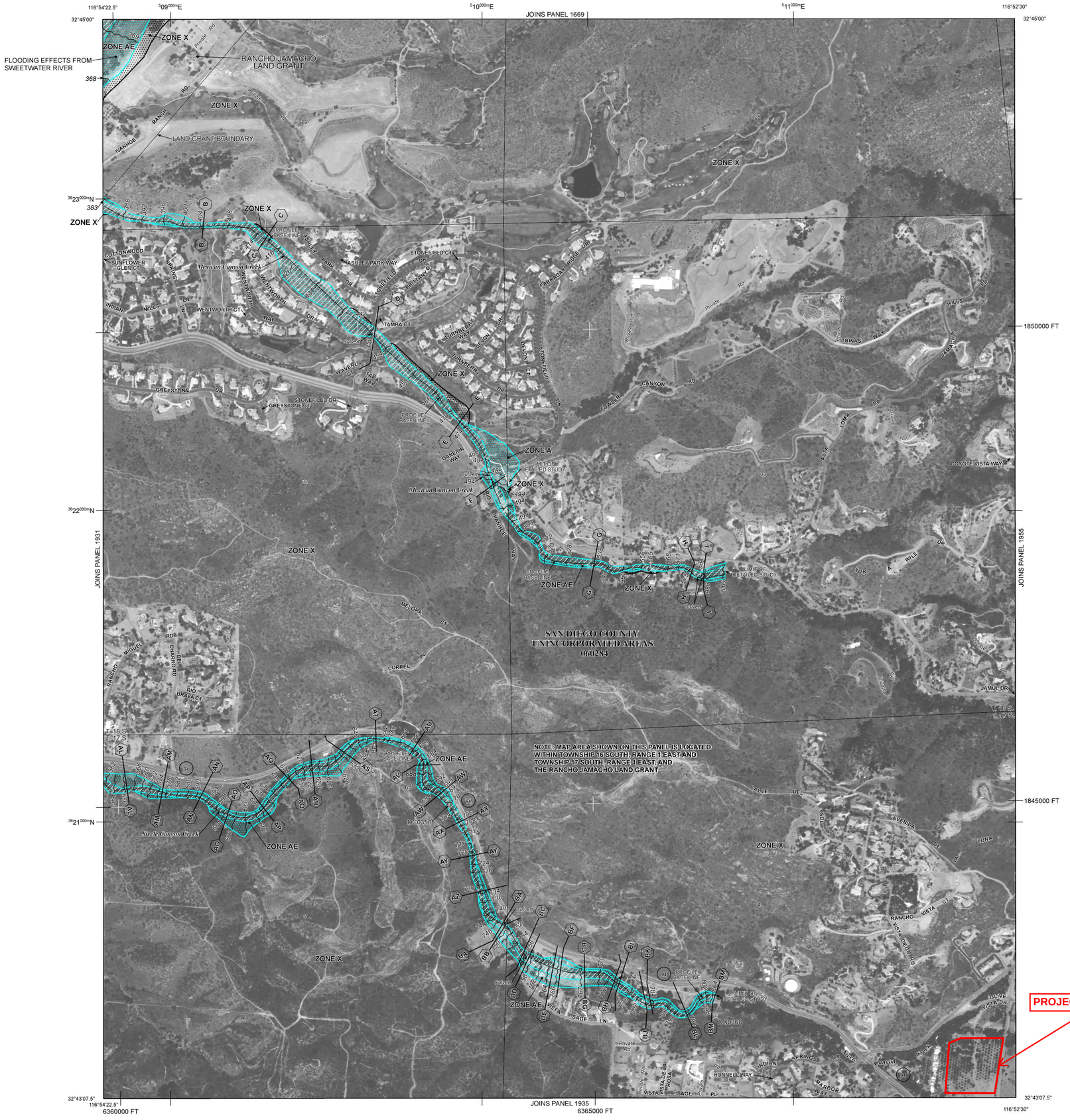
Corporate limits shown on this map are based on the best data available at the time of publication. Because changes due to annexations or de-annexations may have occurred after this map was published, map users should contact appropriate community officials to verify current corporate limit locations.

Please refer to the separately printed **Map Index** for an overview map of the county showing the layout of map panels; community map repository addresses; and a Listing of Communities table containing National Flood Insurance Program dates for each community as well as a listing of the panels on which each community is located.

Contact the **FEMA Map Service Center** at 1-877-FEMA MAP (1-877-336-2627) for information on available products associated with this FIRM. Available products may include previously issued Letters of Map Change, a Flood Insurance Study report, and/or digital versions of this map. The FEMA Map Service Center may also be reached by Fax at 1-800-358-9620 and its website at http://msc.fema.gov/.

If you have **questions about this map** or questions concerning the National Flood Insurance Program in general, please call **1-877-FEMA MAP** (1-877-336-2627) or visit the FEMA website at http://www.fema.gov/business/nfip/.

The **"profile base lines"** depicted on this map represent the hydraulic modeling baselines that match the flood profiles in the FIS report. As a result of improved topographic data, the "profile base line", in some cases, may deviate significantly from the channel centerline or appear outside the SFHA.



LEGEND

SPECIAL FLOOD HAZARD AREAS SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD

The 1% annual chance flood (100-year flood), also known as the base flood, is the flood that has a 1% chance of being equaled or exceeded in any given year. The Special Flood Hazard Area is the area subject to flooding by the 1% annual chance flood. Areas of Special Flood Hazard include Zones A, AE, AH, AO, AR, A99, V, and VE. The Base Flood Elevation is the water-surface elevation of the 1% annual chance flood.

ZONE A	No Base Flood Elevations determined.
ZONE AE	Base Flood Elevations determined.
ZONE AH	Flood depths of 1 to 3 feet (usually areas of ponding); Base Flood Elevations determined.
ZONE AO	Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined.
ZONE AR	Special Flood Hazard Area formerly protected from the 1% annual chance flood by a flood control system that was subsequently decertified. Zone AR indicates that the former flood control system is being restored to provide protection from the 1% annual chance or greater flood.
ZONE A99	Areas to be protected from 1% annual chance flood event by a Federal flood protection system under construction; no Base Flood Elevations determined.
ZONE V	Coastal flood zone with velocity hazard (wave action); no Base Flood Elevations determined.
ZONE VE	Coastal flood zone with velocity hazard (wave action); Base Flood Elevations determined.

FLOODWAY AREAS IN ZONE AE

The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increases in flood heights.

OTHER FLOOD AREAS

ZONE X	Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood.

OTHER AREAS

ZONE X	Areas determined to be outside the 0.2% annual chance floodplain.
ZONE D	Areas in which flood hazards are undetermined, but possible.

COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

OTHERWISE PROTECTED AREAS (OPAs)

CBRS areas and OPAs are normally located within or adjacent to Special Flood Hazard Areas.

1% annual chance floodplain boundary
0.2% annual chance floodplain boundary
Floodway boundary
Zone D boundary
CBRS and OPA boundary
Boundary dividing Special Flood Hazard Area Zones and boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths, or flood velocities
513 — Base Flood Elevation line and value; elevation in feet*
(EL 987) — Base Flood Elevation value where uniform within zone; elevation in feet*

* Referenced to the North American Vertical Datum of 1988

A — A — Cross section line
23 — 23 — Transect line
97°07'30", 32°22'30" — Geographic coordinates referenced to the North American Datum of 1983 (NAD 83), Western Hemisphere
4275 000m E — 1000-meter Universal Transverse Mercator grid ticks, zone 11
6000000 FT — 5000-foot grid values: California State Plane coordinate system, Zone VI (FIPSZONE = 406), Lambert projection
DX5510 — Bench mark (see explanation in Notes to Users section of this FIRM panel)
M1.5 — River Mile

MAP REPOSITORIES
Refer to Map Repositories list on Map Index

EFFECTIVE DATE OF COUNTYWIDE FLOOD INSURANCE RATE MAP
June 19, 1997

EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL
May 16, 2012 – to update corporate limits, to add roads and road names, to incorporate previously issued Letters of Map Revision, and to update map elevations to North American Vertical Datum of 1988.

For community map revision history prior to countywide mapping, refer to the Community Map History table located in the Flood Insurance Study report for this jurisdiction.

To determine if flood insurance is available in this community, contact your insurance agent or call the National Flood Insurance Program at 1-800-638-6620.

MAP SCALE 1" = 500'

250 0 250 500 750 1,000 FEET
150 0 150 300 METERS

NFIP
NATIONAL FLOOD INSURANCE PROGRAM

PANEL 1932G

FIRM

FLOOD INSURANCE RATE MAP

SAN DIEGO COUNTY, CALIFORNIA AND INCORPORATED AREAS

PANEL 1932 OF 2375

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
SAN DIEGO COUNTY	060284	1932	G

Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

MAP NUMBER
06073C1932G

MAP REVISED
MAY 16, 2012

Federal Emergency Management Agency

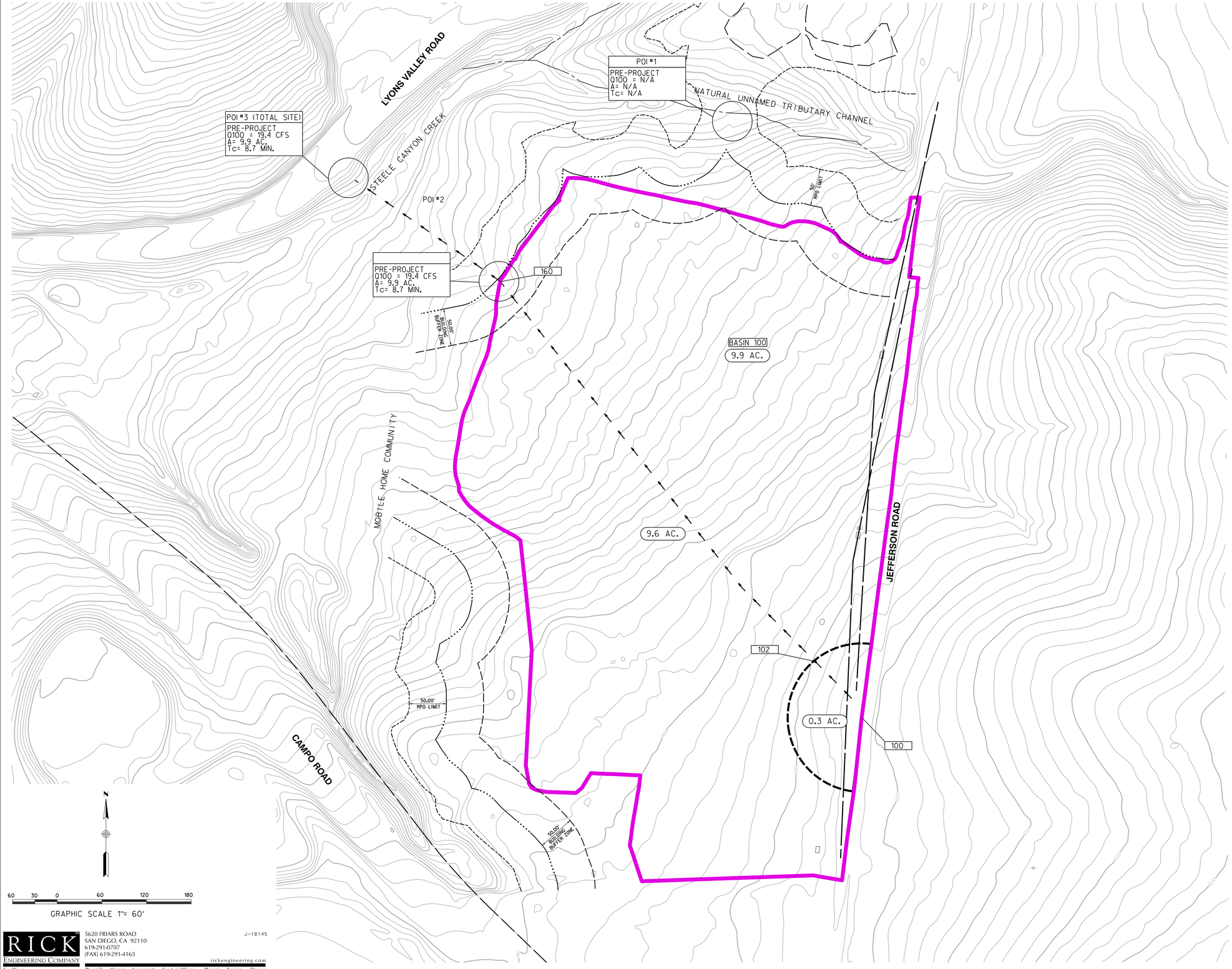
MAP POCKET 1

Drainage Study Map

for

Jamul Retail Center

[Pre-project]



NOTES

1. UNDERLYING HYDROLOGIC SOIL GROUP: TYPE "C"
2. PURSUANT TO THE PROJECT'S GEOTECHNICAL REPORT, GROUNDWATER IS EXPECTED TO BE DEEPER THAN 50 FEET BELOW EXISTING GROUND. GROUNDWATER WAS NOT ENCOUNTERED DURING THE SOILS INVESTIGATION.
3. OFF-SITE AREA DRAINING WESTERLY ONTO JEFFERSON ROAD IS CONVEYED NORTHERLY INTO A NATURAL UNNAMED CHANNEL OR SOUTHWESTERLY TOWARD CAMPO ROAD, BYPASSING THE PROJECT SITE
4. POI 1 IS PROVIDED FOR REFERENCE PUSPOSES ONLY. STORMWATER GENERATED FROM THE SITE IS NOT TRIBUTARY TO POI 1 IN THE PRE-PROJECT CONDITION; HOWEVER, IT IS IN THE POST-PROJECT CONDITION. POI 1 WAS SELECTED AS THE PROJECT'S OUTFALL TO MINIMIZE IMPACTS TO RIPERIAN AND BILOGOCIAL OPEN SPACE THROUGH COORDINATION WITH THE PROJECT BIOLOGIST. ADDITIONALLY, POI 1 WAS SELECTED IN ORDER TO MITIGATE EXISTING ADVERSE DRAIANGE CONDITIONS AT THE DOWNSTREAM MOBILE HOME PARK DUE TO THE PROJECT SITE.
5. POI 3 IS PROVIDED FOR REFERENCE PURPOSES ONLY. POI 3 IS THE CONFLUENCE OF THE ENTIRE SITE AT STEELE CANYON CREEK AND DOES NOT INCLUDE OFF-SITE AREAS.

LEGEND

- DRAINAGE BASIN BOUNDARY
- DRAINAGE BASIN SUBAREA BOUNDARY
- XX.X AC. — TRIBUTARY AREA TO DRAINAGE BASIN
- BASIN X — DRAINAGE BASIN ID
- XXX — DRAINAGE NODE NUMBER
- FLOW PATH
- (POI) POINT OF INTEREST

DRAINAGE STUDY MAP FOR JAMUL RETAIL CENTER (PRE-PROJECT)

J-18145

Date: March 26, 2018
Revised: July 10, 2018
Revised: October 10, 2018

RICK ENGINEERING COMPANY
San Diego
5620 FRIARS ROAD
SAN DIEGO, CA 92110
619-291-0707
(FAX) 619-291-4165
rickengineering.com
Riverside - Orange - Sacramento - San Luis Obispo - Phoenix - Tucson - Denver

NOT FOR CONSTRUCTION - EXHIBIT FOR PRELIMINARY DRAINAGE STUDY

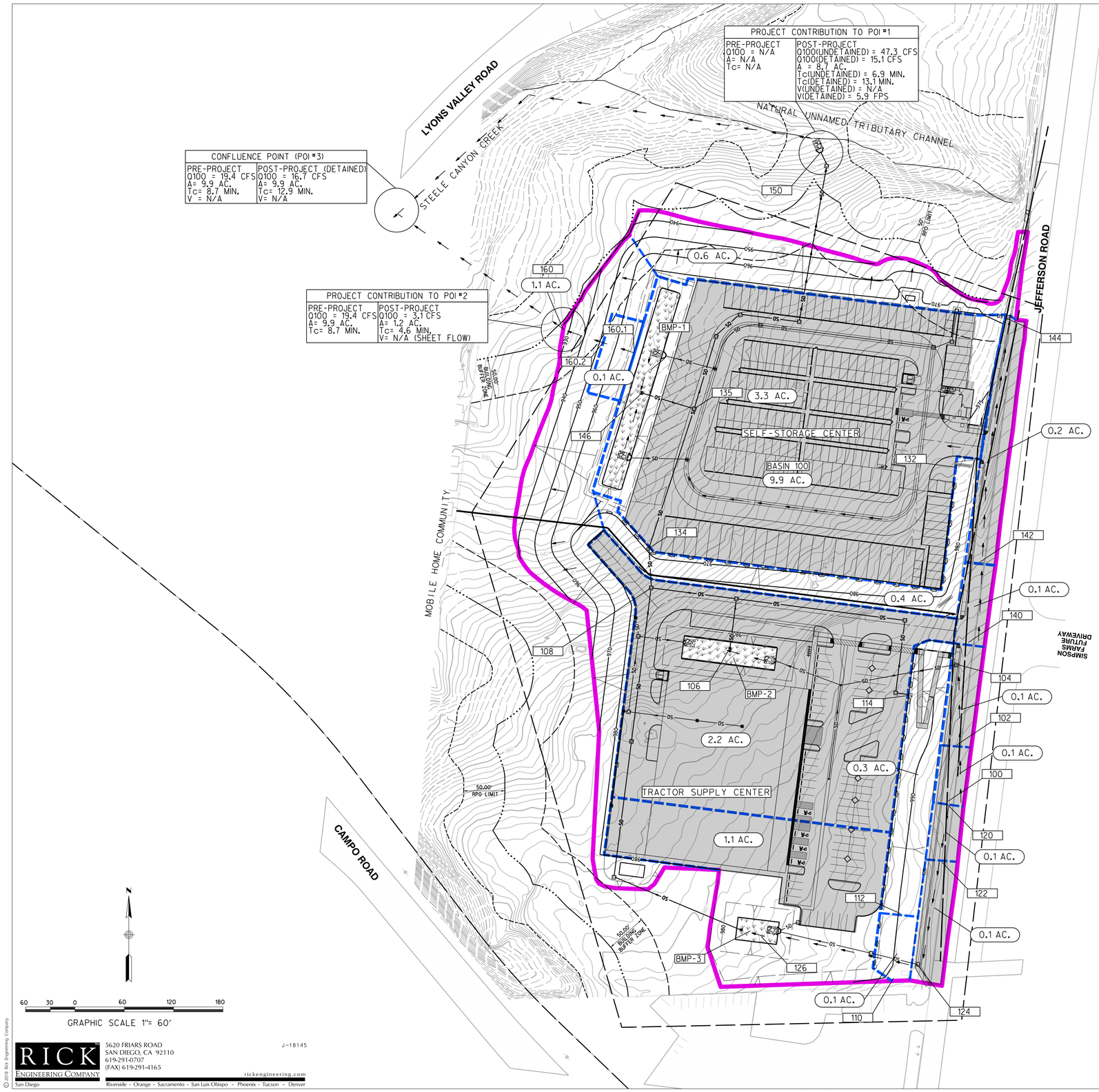
MAP POCKET 2

Drainage Study Map

for

Jamul Retail Center

[Post-project]



NOTES

1. UNDERLYING HYDROLOGIC SOIL GROUP: TYPE "C"

2. PURSUANT TO THE PROJECT'S GEOTECHNICAL REPORT, GROUNDWATER IS EXPECTED TO BE DEEPER THAN 50 FEET BELOW EXISTING GROUND. GROUNDWATER WAS NOT ENCOUNTERED DURING THE SOILS INVESTIGATION.

3. OFF-SITE AREA DRAINING WESTERLY ONTO JEFFERSON ROAD IS CONVEYED NORTHERLY INTO A NATURAL UNNAMED CHANNEL OR SOUTHWESTERLY TOWARD CAMPO ROAD, BYPASSING THE PROJECT SITE

4. IT SHOULD BE NOTED THAT POI 3 IS THE CONFLUENCE OF THE SITE AS A WHOLE (FLOWS FROM POI 1 AND 2) AT STEELE CREEK. THE ANALYSIS DOES NOT INLCUDE FLOWS FROM OFF-SITE CONTRIBUTING AREAS. THE TOTAL PEAK FLOW FOR THE ENTIRE SITE DURING THE POST-PROJECT CONDITION IS LESS THAN THE EXISTING CONDITION (AT POI 3); THEREFORE, IT IS ANTICIPATED THAT THERE WILL BE NO ADVERSE IMPACTS TO THE EXISTING MOBILE HOME COMMUNITY OR DOWNSTREAM DRAINAGE FACILITIES AS A RESULT OF THE PROJECT.

5. THROUGH COORDINATION WITH THE PROJECT'S BIOLOGIST, POI 1 WAS SELECTED AS THE DISCHARGE POINT FOR A MAJORITY OF THE PROJECT AREA IN ORDER TO MINIMIZE IMPACTS TO RIPERIAN AREAS AND BIOOLIGICAL OPEN SPACE AND ALSO TO MITIGATE EXISTING ADVERSE DRAIANGE CONDITIONS ON THE DOWNSTREAM MOBILE HOME PARK. POI 1 IS LOCATED APPROXIMATELY 550 FEET UPSTREAM OF THE EXISTING CONFLUENCE WITH STEELE CANYON CREEK (POI 3).

LEGEND

- DRAINAGE BASIN BOUNDARY
- DRAINAGE BASIN SUBAREA BOUNDARY
- XX.X AC. — TRIBUTARY AREA TO DRAINAGE BASIN
- BASIN X — DRAINAGE BASIN ID
- XXX — DRAINAGE NODE NUMBER
- LOCATION OF BIOFILTRATION BASIN
- BMP-X — STRUCTURAL BMP
- FLOW PATH
- (POI) POINT OF INTEREST

DRAINAGE STUDY MAP FOR JAMUL RETAIL CENTER (POST-PROJECT)

J-18145

Date: March 26, 2018
Revised: July 10, 2018
Revised: October 8, 2018

RICK ENGINEERING COMPANY
San Diego
5620 FRIARS ROAD
SAN DIEGO, CA 92110
619-291-0707
(FAX) 619-291-4165
rickengineering.com
Riverside - Orange - Sacramento - San Luis Obispo - Phoenix - Tucson - Denver

NOT FOR CONSTRUCTION - EXHIBIT FOR DRAINAGE STUDY ONLY

ATTACHMENT 7

Copy of Project's Geotechnical and Groundwater Investigation Report

This is the cover sheet for Attachment 7.

If hardcopy or CD is not attached, the following information should be provided:

Title:
Prepared By:
Date:

This page was left intentionally blank.